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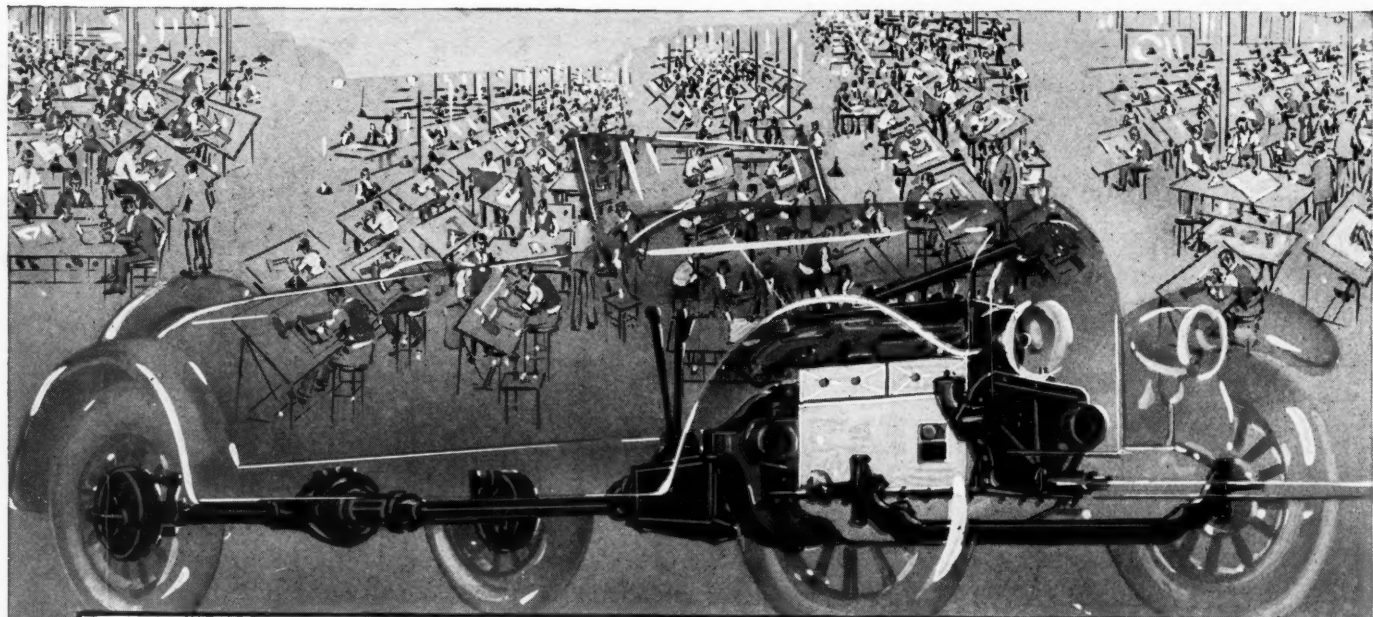
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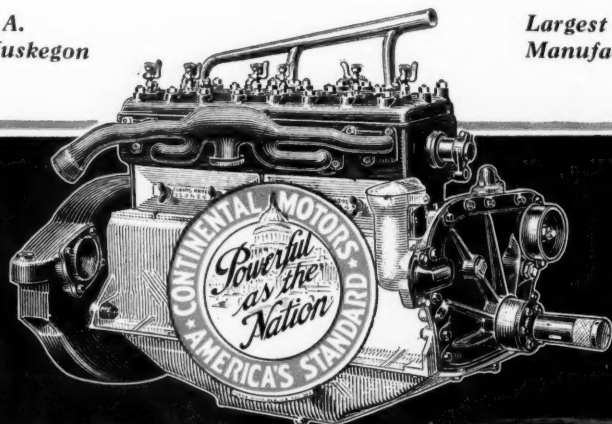
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NEW YORK—THURSDAY, JUNE 22, 1922.

No. 25

New Problems of Engineer Shown at S. A. E. Meeting

President Bachman says automotive engineer must have part in solving questions of transport as well as design. New standards adopted. 500 members attend Summer meeting at White Sulphur Springs. Financial report read. Nomination Committee appointed.

WHITE SULPHUR SPRINGS, W. VA., June 20—Five hundred members and guests are attending the annual midsummer meeting of the Society of Automotive Engineers which began here to-day. The meeting will continue until the end of the week. Everyone is agreed that this is the most attractive place at which a summer meeting of the Society has ever been held.

Mild weather and invigorating mountain atmosphere are making the sports program specially attractive this year. Two golf courses, tennis courts, a swimming pool, horse back riding, trap shooting equipment and other facilities provide for a greater diversity of entertainment than ever before.

Special trains from the East and the Middle West brought the majority of the five hundred guests this morning, although a few golf enthusiasts arrived during Saturday and Sunday. More than 120 ladies are in attendance.

Golf, tennis and bathing are merely the diversions of the meeting, however, as was evidenced by the large attendance at the standards meeting which lasted most of the day and the business session which

took place this evening. President Bachman addressed the membership at the evening meeting.

A large proportion of the active and prominent engineers of the industry are in attendance, so that the constructive work of this meeting is likely to be considerable. Five past-presidents of the Society are present, together with nearly all the "old standbys" of the organization.

Practically all of the recommendations of the Standards Committee were

adopted without change, although a few minor alterations were made. A summary of the recommendations appeared in AUTOMOTIVE INDUSTRIES last week. Chairman E. A. Johnston of the Standards Committee had no difficulty in completing his lengthy report by 4 p. m.

WE should exercise all our ability and energy to proceed in a rational way to extend and continue the Standards work which was inaugurated about twelve years ago and has been carried on continually since.

I wish that we could find some way of still further impressing upon the automobile and allied industries the importance of this work; that we could find a successful method of definitely determining the degree to which the Standards are used and a more definite measure of the economies which their use brings about.—B. B. Bachman.

The automotive engineer must take an active part, not only in designing vehicles, but also in solving those problems of highway construction and transportation which involve the increasing profitable use of cars and trucks. The speed-wagon, the motor bus and the motor rail car are the three outstanding developments of recent months in the automotive field.

The problems of design and operation that they have brought with them call for serious attention from the automotive engineer. Research and standardization will play an important part in their solution.

These are the high spots of B. B. Bachman's presidential address delivered at the opening session of the summer meeting of the Society of Automotive Engineers. Bachman said in part:

AFTER this more or less hurried summary of the affairs of the society, I would direct your attention to a more general survey, with a view of determining along what lines our activities as engineers and as an engineering society should be directed in the immediate future.

The period of industrial depression through which we have gone should be productive of some lessons to which it would be well for us to give thought. Naturally, those which appeal to me most forcibly and which I feel most competent to discuss are those which have to do with the truck rather than the passenger vehicle. There have been three outstanding developments during recent months, the appearance of which may be due in part to conditions resulting from the depression. They are: the speed-wagon, the motorbus and the motor rail car. That there is a fertile field of usefulness for all three of these types can probably be accepted without question. That they each present features of design requirements which are distinctive and possibly not yet fairly appreciated in general is, I believe, also true.

We held in January and will hold at this meeting a session dealing in a degree with the problem of bus transportation. There have been sessions held by the Metropolitan and the Indiana Sections which had to do with the matter of the railway motor car. The problem of the speed-wagon may be more commercial than technical, but I believe that it deserves consideration. I am mentioning these points with the hope that our sections will find some suggestions for their development for meeting topics.

The question of highways is one which has been given considerable attention in the past in our discussions and should receive continuing attention. The ability and the efficiency of the vehicles which we manufacture are dependent in a large degree upon the character of the roads upon which they are operated. While it is true that the invention and development of the automobile has increased the demand for improved roads, it is also true that the growth of improved roads has increased the demand for and use of the motor vehicle, and future limitation in road construction will act as a limitation on the vehicle market.

It appears to me to be particularly unfortunate that there should be any controversy between the railroads and the users and manufacturers of motor vehicles, in-

stead of complete harmony and co-operation. Except in the most isolated cases, competition between these two forms of transportation is most unlikely. I think this is almost universally true with regard to transportation of goods; and in the transportation of passengers it is almost equally true if we stretch our imagination to embrace what must be the development of the future. I recognize the fact that there is a large amount of capital invested in street railway transportation, but I am also impressed more and more daily with the fact that the streets of our cities are becoming less able to accommodate the burden of traffic which they are called upon to bear. It seems to me not at all improbable that this condition will make it imperative in the not very distant future to replace track vehicles with a more flexible form of vehicle for short hauls and where frequent stops are necessary.

This problem of highway capacity as evidenced by our city streets deserves the most careful study on the part of every automotive engineer, particularly as to what its probable effect will be on future design requirements as affecting the size of the vehicle, the control with respect to steering, turning-radius, acceleration and braking. In many of our cities very stringent regulations with regard to parking have been put into force. It is useless to spend our time in railing against these provisions, for in some measure at least they represent the legitimate effort to distribute the use of the streets in a fair way among all citizens. The problem presented is of the most complex nature and deserves careful study and analysis.

Another result of the increasing traffic-density is the lowering of the efficiency of motor vehicles as a means of saving time. As the cost of operation of motor vehicles has been reduced, and the possibility of use thereby increased, this new factor of limitation of speed, due to congestion, becomes increasingly important.

In the broader aspect of transportation in rural and suburban communities there should be practically no question of conflict between the railway and the motor vehicle. We have in this country a sufficiently close-up picture of the development of transportation facilities to be able to get a very comprehensive view of the relation between various means of transportation and the establishment of communities.

THE early settlements were along the seaboard and the more navigable streams, and this condition of affairs continued up to the time of the development of the railway, which resulted in the unlocking of the vast inland empire and the linking up of the Pacific Coast with the Atlantic, which would have been practically impossible without this new means of transportation. The development of electricity and its application to high-speed interurban lines was the next step in bringing high-speed transportation into closer contact with the small community and individual. It is obvious, however, that the operation of rail lines calls for a virtual monopoly of territory in the form of a franchise and limits the operation of vehicles over any given track to one centralized authority and calls for fixed schedules of operation.

The advent of the automobile has resulted in placing



President B. B. Bachman

into the hands of the individual a smaller and more flexible unit with practically the equivalent speed-capacity of the railway. This vehicle, capable of being operated over the road, can be made more truly competitive and infinitely more flexible and independent of fixed schedules. The growing use of the automobile and the truck, coincident with the development of and as an auxiliary to the railway system, has resulted in extensive suburban and rural development which would probably have been as impossible without the automobile as the development of the inland cities of this country would have been without the railroad.

While this development has resulted and the increase in realty value is recognized and acknowledged, the increasing traffic, particularly over main routes, will bring a reaction unless we are peculiarly alert to study and suppress in design all objectionable characteristics of our vehicles to the greatest possible degree. I appreciate that the control of all these features is not in the hands of the engineer or manufacturer, but he should be thoroughly posted as to what they are and be prepared to co-operate intelligently with regulatory bodies to assure that rational measures for the protection of the public are enforced which do not impose unreasonable restriction on road transportation.

Originally road construction was in the hands of individuals or corporations that operated them for profit in the collection of tolls. While we have rejected, as a nation, the idea of public ownership of railroads, so also have we rejected the idea of private ownership of highways. I believe both these ideas are proper. In the railroad we require concentration of authority and responsibility in operation over any one given line. This can be obtained most efficiently by private ownership and operation under reasonable government regulation. The highway, on the other hand, is primarily for the use of the individual according to his needs and desires, with as little restriction as possible consistent with public safety, which can be obtained best by public ownership and complete government control.

Much of the discussion on the question as to who should bear the burden of the cost of construction and maintenance of our highway systems, or whether the motor-vehicle operator is receiving a public subsidy which is not shared by the railroad, etc., appears to be beside the point. The cost of transportation of passengers and freight, by railroad, water or highway, is borne by the whole community and shared by every citizen in proportion to his requirements for transportation. I believe this to be so, whether the cost of transportation is

included in the cost of the commodity or it appears partially in the form of taxes. The big fundamental problem is to determine the economic field for each medium of transportation and the relation each should bear to the other for maximum efficiency, and the most satisfactory means of proportioning the expense to the individual.

I have endeavored to the best of my ability to give you a brief and yet comprehensive view of the problems which are confronting us and should receive our active individual and collective attention. I hope the result may be to stimulate interest in the affairs of the society and enlargement of the horizon in our view of the future activity of, and the service which can be rendered by, each of us individually and as an organization.

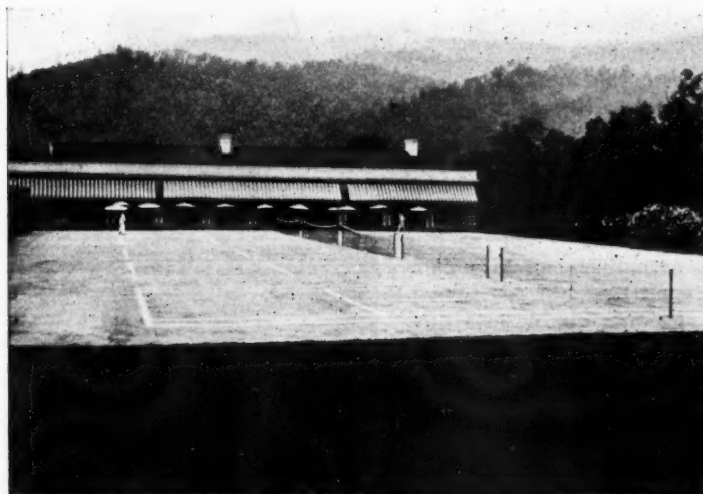
Bachman also reviewed the general work of the society during the past year, discussing briefly the activities of the meetings committee, the restriction of membership, the society finances, the progress in standardization and the research work.

THE Standards Committee has done some excellent work during the past year. Among its accomplishments should be noted the following:

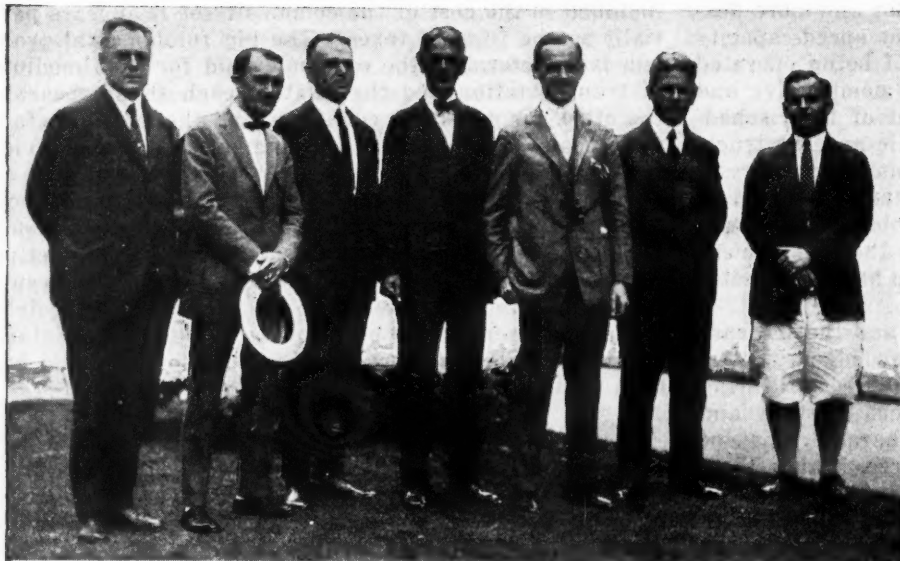
1. Mountings for car bumpers were standardized.
2. Ball studs for steering connections were adopted.
3. Adjustable yokes for brake rods and similar uses were adopted.
4. Serrated fittings for shaft ends from $\frac{1}{8}$ to $\frac{3}{8}$ inches diameter shafts and tapers were adopted.
5. Standards were adopted for tempers and toughness of lock washers.
6. Dimensions for five spindle sizes for motor truck axles were standardized.
7. Base shaft dimensions for small magneto mountings for isolated electric plants were standardized.
8. The two bolt flange dimension in four sizes of motorcycle carburetors were adopted.
9. Threaded ends for car top irons were standardized.

This list is a fine record of constructive achievement. The recommendations not accepted were of comparatively small importance. The proposed standard of three-quarter inch hole for crankcase draining was rejected, as not being sufficiently specific.

Three lighting bulb sizes were eliminated. These were bulb sizes G 10, G 12 and G 16 $\frac{1}{2}$. 8-10 and 18-24 voltage ranges in bulbs were dropped as were four and nine battery cell arrangements. The proposed specifications for soft annealed copper wire were also rejected. Roll-



This is where the engineers are spending their afternoons during the Summer Meeting



Some of the S. A. E. council members and two of the permanent staff. Left to right—C. F. Clarkson, Lon K. Smith, O. W. Young, H. M. Crane, President B. B. Bachman, Past-President David Beecroft, L. C. Hill

ing tolerances for concave spring steel and for wire spring steel were adopted.

Standards for screw bolts and nuts were amplified by specifying length of thread and position of cotter pin. The present recommended practice for spring eye bushing and bolt tolerances were revised by eliminating bolt tolerances and changing the title to spring eye bushing. The present recommended practice for frame brackets for springs was canceled. Specifications of tests for headlamp lighting control devices were revised.

Specifications for non-ferrous alloys were modified to cover ingots as well as finished products for bearing metals. New specifications were adopted for phosphor bronze, spring strips, aluminum sheets and strips and brass wire for brazing. The screw thread report was accepted.

The committee will leave to the American Engineering standards committee the task of standardizing a series of plain washers used in all industries. The draw-bar adjustment standard was elaborated to cover 2, 3 and 4 plows; where formerly there was one now there is a different one for each plow.

The supplementary report on general information regarding gages and gaging was referred back.

An informal proposal to standardize ten grades of lubricating oil provoked strong discussion by oil representatives and matter will be handled by lubricant division. Engine flywheel housing recommendations adopted.

A two-day production meeting of society will be held in Detroit in October and made annual affair to be held in different cities on successive years. The forenoon of each day may be given over to technical sessions and afternoon to factory visits, a program for the Detroit meeting will be announced soon.

The membership in general session voted in favor of council arranging to hold evening meetings in many cities, such as St. Louis, Milwaukee, Syracuse, Akron, Cincinnati, Peoria and Pittsburgh, where there are no sections in order to give members in such cities more service from the society.

Report of Lon Smith, chairman of the membership committee, showed a gain of 132 members during the first eight months of this year and a present total membership of 5530. The securing of new members and holding old ones was the major topic discussed at the

business session; many members pledged to get two new members before the winter meeting.

THE financial report of the Society as of June 1, 1922, was presented at the business meeting on Tuesday morning. The report was as follows:

The Society's net loss for the first eight months of this fiscal year was \$18,360.26 as compared with an unexpended income of \$14,504.88 for the corresponding period of last year. This loss is due to a reduction in income of \$27,439.30 as compared with the first eight months of the last fiscal year.

The advertising sales fell off \$7,595.66 and the expense of selling advertising was increased \$11,540.09, making a total decrease in net revenue from advertising of \$19,135.75 as compared with the first eight months of the last fiscal year. The

net revenue from advertising has averaged about \$5,500 per month for the past eight months, but has increased steadily since January, the gross business for the month of June being about \$15,000, with a net balance of approximately \$10,000 for Society activities when cost of sales has been deducted.

Initiation fees from new members are \$6,335 less than for the same eight months of last fiscal year.

By careful management on the part of the president, the treasurer, the council and the various committeemen the total operating expense has increased only \$5,425.84, as compared with the first eight months of last fiscal year, in spite of added activities costing approximately \$10,000.

The assets of the Society at April 30 were \$180,127.63, offset by accounts payable of \$9,159.29 and special reserves of \$50,758.11, leaving net assets of \$120,210.23; \$89,998.49 of this is in the form of Railroad and U. S. Government bonds and accrued interest and the balance is the invested working capital.

THE nominating committee was also appointed at this session, and will make a report before the end of the meeting. This committee is composed of members elected by each of the sections, and three members elected at the summer meeting. The section members of this committee will be instrumental in determining the officers of the S. A. E. for next year.

Considerable interest is being evidenced in the section stunts, some of which are particularly attractive this year.



H. M. Swetland, chairman of the Finance Committee

S. A. E. Summer Meeting

How to Secure Effective Lubrication

Crankcase oil must be renewed frequently. Rate of oil pumping depends on oil thrown to cylinders, speed of revolution, piston drainage, viscosity and cylinder vacuum. Piston rings affect pumping. Oil grooves with return holes keep down oil consumption.

By G. A. Round*

GEORGE A. ROUND, Assistant Chief, Engineering Division, Automotive Department, Vacuum Oil Co., in his paper on "Oil Pumping," said that to secure good lubrication and offset the effects of dilution the crankcase oil must be renewed at frequent intervals. This can be done either by periodic draining of the entire supply or by the frequent addition of fresh oil to replace that used. Where the oil consumption is low the former method is the natural one. Unfortunately the draining of the oil is such a disagreeable task that many owners neglect it. In many engines the oil consumption increases to an undesirable extent after a comparatively short period of service, and it is this class that Mr. Round's paper was chiefly concerned with.

The rate of oil pumping depends upon the following principal factors: The amount of oil thrown to the cylinders; the speed of revolution; the efficiency of the means for piston drainage; the ring fit; the oil viscosity and character and the vacuum in the cylinder. Mr. Ricardo in his paper at the Winter Meeting stated that he had been unable to determine any effect of the vacuum in the cylinder on the oil pumping, but an engineer who was working out a device for preventing oil pumping and sealed the crankcase so that a vacuum equal to that in the intake pipe was maintained in it, found that the oil loss was reduced by one-half. There was no smoking when accelerating after prolonged idling.

As a general thing the oil consumption decreases with an increase in the viscosity of the oil, but in several cases of engines with cast iron pistons having no scraper rings on the skirt, but oil return holes through the piston wall at the bottom of the lowest ring groove, the reverse relationship was found to hold true. In one engine with force feed and one with splash lubrication the less viscous oil showed the higher economy. The first of these, a small six-cylinder engine, consumed 1.37 lb. of the lighter oil in 10 hrs. and 2.1 lb. of the heavier oil under similar operating conditions. In the case of the splash-lubricated engine, a single cylinder lighting unit, the consumption was 0.5 lb. of the lighter oil in 10 hrs. and 2.6 lb. of the heavier oil. The consumption figures in both cases were corrected for dilution.

The viscosities were 45 and 58 seconds Saybolt at 210 deg. Fahr. The conclusion is reached that the resistance

to the flow of the lubricant behind the ring in the groove where the return holes were located was the controlling factor, as with a different form of oil return the behavior of the oils was quite normal. High fire test oils also show a reduced consumption, especially in tractor and heavy truck engines, but the use of such oils is not always to be recommended, because of the fact that they may not burn cleanly when running under small load.

It has been found that the piston rings have much to do with oil pumping. The important factors are the amount and uniformity of the ring pressure and the clearance of the ring in the groove, while the end clearance in the groove is of minor importance. That oil pumping is very much dependent upon the unit pressure of the ring against the cylinder wall was shown by an experiment with an aircraft engine in which the oil consumption was reduced 30 per cent by cutting down the bearing surface of the ring about one-third, increasing the pressure per unit area about 50 per cent.

The fit of the rings in their grooves is of prime importance, as experience has shown that where the amount of oil thrown onto the cylinder walls is constant, as with splash systems, the oil consumption increases rapidly with the wear of the groove. With cast iron pistons and relative wear of the groove.

OIL grooves with return holes are a great help in keeping down the oil consumption.

The large increase in the use of pressure feed during the past few years is mentioned, and the observation made that the V-type engine requires this form of lubrication, for equal distribution to all cylinders. Its great disadvantage is that the amount of oil thrown to the cylinders increases with the wear of the bearings, whereas with splash lubrication it remains constant. With the pressure feed system there is danger that at light loads the amount of oil thrown onto the cylinder walls is excessive. Accurate fitting of bearings tends to minimize oil-pumping, but this is often nullified later by poor repair work. As regards connecting rod bearings, Mr. Round claims that the ideal design has no shims. Where these are used, either the lead-edged or plain brass shim is satisfactory only when properly fitted. If a bearing fails from lack of oil the lead edge will be destroyed and the repairman is likely to overlook this fact, with resultant trouble. For truck and tractor service this shim seems to be less satisfactory.

*Digest of paper presented at Summer Meeting of Society of Automotive Engineers.

S. A. E. Summer Meeting

What Constitutes a Perfect Motor Bus?

Controlling design factors are safety, comfort, and minimum operating cost. They can be obtained with low center of gravity, wide frame, track and spring centers, and effective braking. Short turning radius is necessary together with clear vision for driver.

By G. A. Green*

IN its broadest sense we believe the controlling design factors from the standpoint of the motorbus, in the order of their importance, are:

- (1) Safety.
- (2) Comfort and convenience of the public.
- (3) Minimum operating cost.

Safety easily heads the list and a very large proportion of the engineering development work must be concentrated under this heading. It is generally agreed that a truck carrying freight should be in all respects safe, and that every reasonable precaution should be

*General manager, Fifth Avenue Coach Co., New York. Excerpt from a paper read before the summer meeting of the Society of Automotive Engineers.

taken to render automobiles transporting from one to seven passengers safe; so how much more important is it that a vehicle carrying fifty or more passengers should be free from every sort of hazard! It must be remembered that much of the mileage of the bus is through congested thoroughfares. This is not the case with the average automobile or truck. Again, the average individual makes some effort to get out of the way of a truck or automobile, but the bus, with its acknowledged flexibility, is supposed to move out of the paths of both vehicles and pedestrians.

The design of a motorbus from a safety standpoint includes certain basic features which must be incorporated in the general constructional plan. There are also other detail features which must be included. The latter are dictated by humane considerations. Reference is now being made to providing the driver with reasonable comfort and convenience so that no undue hardship will be inflicted upon him as a result of the performance of his duties. First, let us consider the former. These are

- (1) Low center of gravity.
- (2) Wide frame, track and spring centers and general dimensions.
- (3) Effective brakes.
- (4) Short turning radius.

Beyond doubt, the future bus will be low hung. The inherent danger in connection with any other form of construction is the possibility of overturning.

We have found that a safe and practical height of the frame from the ground for a single-deck bus is 25 in. and for double-deck bus 18 in. The center of gravity of our type-L double-deck vehicles, with a full complement of passengers on both decks, is 52 in. from the ground. With our type-J single-deck bus, this dimension is 38 in. It is interesting to note that when rounding corners, even at a high rate

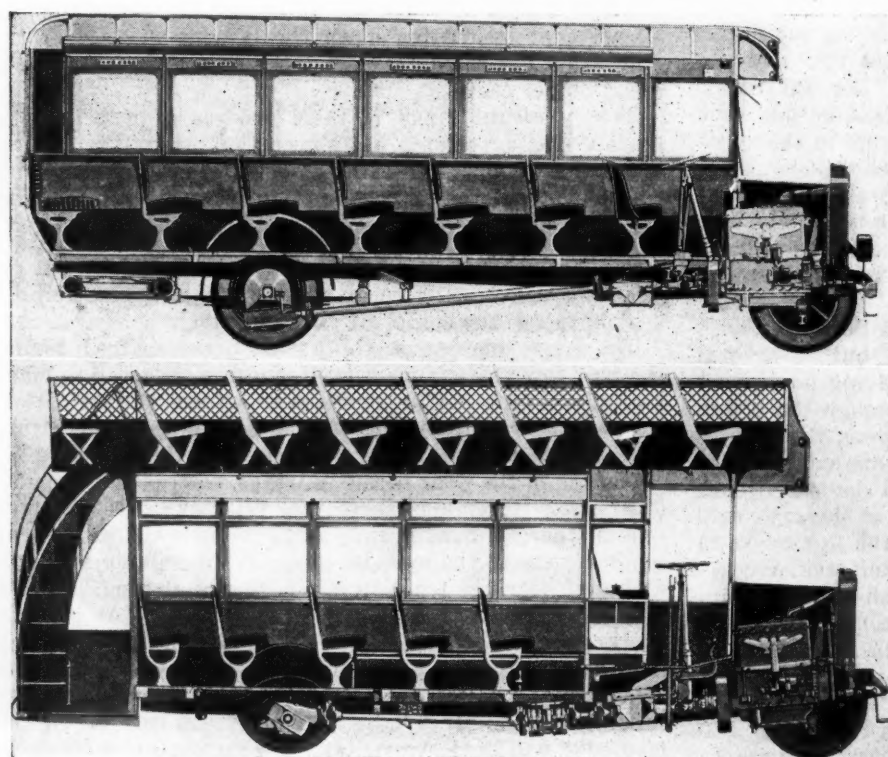


Fig. 1 (above)—Sectional view of J-type single-deck bus. Fig. 2 (below)—Sectional view of L-type double-deck bus

of speed, skidding will occur, due to centrifugal force and overturning is scarcely possible. Furthermore, rolling or sideway is practically eliminated. The sectional views of our J and L-type buses, reproduced in Figs. 1 and 2, indicate clearly how this condition has been reached. With type L it will be seen that the frame and rear axle construction is somewhat unconventional. The rear axle is of the internal gear type. The spiral bevel gear and differential assembly is in unit form and can be entirely assembled and adjusted on the bench. The carrying member is a heat-treated forging.

From the sectional drawing shown in Fig. 3 the general construction of the type-L axle will be clear. It will be seen that the ends of the carrying member are cranked, the wheel spindles being above the drive shaft center line. It is in this manner that the low-level feature has been accomplished. The photograph showing the carrying member and driving gear assembly which is reproduced in Fig. 4 at once emphasizes the general simplicity and accessibility of construction. Due to the fact that the drive shaft pinions are in the vertical plane, a special form of tooth has been developed for the internal gear to provide adequate clearance and at the same time permit of maximum silence even after a certain amount of wear has occurred.

We do not employ this special form of axle construction for the type-J bus. This class of vehicle will have a much wider use; therefore the matter of road clearances must be taken into account. In many cases single-deck vehicles will be operated over very bad roads. The double-deck vehicle is essentially a city job where the streets are, generally speaking, in fair condition. Again, with the single-deck vehicle, the floor level requirements are not so exacting. There is no top deck to take care of, and the entrance can therefore be located at the front end of the bus; but with the double-deck vehicle, conventional practice is to have the passengers enter at the rear, so in passing to the interior they are obliged to cross the rear axle, which must be of special design to have the floor level within easy stepping distance of the ground. In the case of the single-deck bus it is not desirable to have a step 18 in. high. Therefore the best plan appears to be to employ an orthodox rear-axle design. Even assuming the use of our type-L rear axle, it would not be practical to produce a stepless vehicle. The appearance would be completely spoiled and, as explained above, the ground clearance would be cut to a point where the vehicle would be unsuitable for use in many localities. Of course, a stepless single-deck vehicle can be produced, but its practical value for general utility purposes is debatable.

Among the constructional difficulties in connection with the production of low level equipment, one of the problems is to obtain a flat floor. There is a natural tendency for the components to project above the frame and therefore through the floor. To avoid this, special design is required. The effect of a flat floor is very pleasing to the eye. Its structural strength is greater. It is less costly to keep in repair and there is less possibility of accidents due to the passengers' feet coming into contact with the obstructions during the boarding and alighting processes.

In construction, wide frame, track and spring centers are features which are necessary to provide for adequate vehicular stability and, in conjunction with a low center of gravity, make for maximum safety. The necessity of providing proper stability applies equally to single and double-deck vehicles. It may be said that the added risk due to the top deck load with the latter is more than equalled by the higher speed of the single-deck unit.

Apart from the matter of safety, a wide frame is necessary in connection with the body construction. Obviously it is desirable to support the body as far out as possible, for in all cases the seating arrangement is such that the passengers are grouped about the outer edges. Then, the wide frame admits of the

lightest possible form of body under-frame. The wide frame also is a factor from the standpoint of the passengers' comfort. This point will be referred to later.

We believe that the overall length of a motorbus for city service should not exceed 26 ft.; the total width, 7 ft. 6 in., and the overall height for single-deck vehicle 9 ft. With the double-deck bus, the last-named dimension should be such that a person standing on the top deck can clear a 14-ft. structure. With these dimensions we have found it possible to accommodate comfortably 51 seated passengers with our double-deck and from 25 to 29 with our single-deck vehicle. Whether this practice is economically correct for all localities, we cannot say. We have, however, up to the present, found that this arrangement works out very well both in our own service and in the service of those who have purchased our equipment.

Next, there is the question of important dimensions other than those over-all, such as the wheelbase which naturally affects the axle load distribution, the turning

THIS article presents in detail the views on bus design of a man who has had very extensive opportunity to build and operate motorbuses. In presenting his opinion as to what a motor bus should be, he has drawn upon his own experience. He has sought to establish principles for general use rather than to merely describe current practice.

The great interest in motorbus construction that has swept through the automotive industry in recent months makes this discussion one of vital interest both from a commercial and an engineering standpoint. Some bus designers will disagree with certain points raised by the writer, but they cannot fail to appreciate the constructive character of this comprehensive discussion.

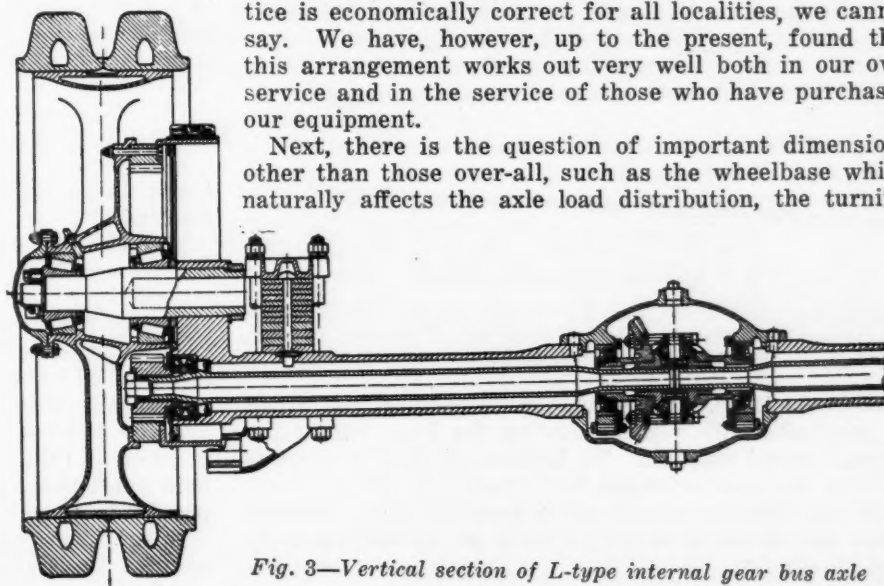


Fig. 3—Vertical section of L-type internal gear bus axle



Fig. 4—Parts of the L-type axle, showing readily detachable driving gear assembly

radius and the general comfort and balance of the vehicle. For the class of vehicle now under discussion, we believe that the wheelbase should not be less than 168 nor more than 180 in.

The front track should be ample in width and not less than 67 in., for to turn a bus within the intersection of the average city street it is necessary to move the front wheels through an angle of not less than 35 deg. This determines the distance between the front-axle pivots and the springs. The spacing of the front springs should not be less than 36 in., since they are responsible to a large extent for the stabilization of the vehicle when turning a corner.

Regarding the rear track, we believe that the outer edge of the tires should closely correspond to the extreme over-all width of the body and that the rear springs should be as close to the tires as is practical. For buses as above described, the rear track should not be less than 72 in. This will bring the distance between the springs to approximately 52 in. Having decided the approximate distance between the vehicle springs, it naturally follows that the best design is to arrange the frame dimensions so that they connect with the springs in the closest and most practical manner. Our practices in regard to these matters may be readily followed from the diagrammatic sketch of the type-J chassis as shown in Fig. 5.

Perhaps the most difficult problem that engineers must face is the brake question. It has not as yet been solved entirely satisfactorily, at least in so far as our knowledge goes. With the bus, the number of applications is in excess of that of the average truck or automobile, and the brakes of a bus must be sufficiently powerful to lock the wheels at any moment. Yet the effort required for average application must not be such that a driver may become exhausted as a result of the work imposed upon him.

Particular attention must be paid to the location of

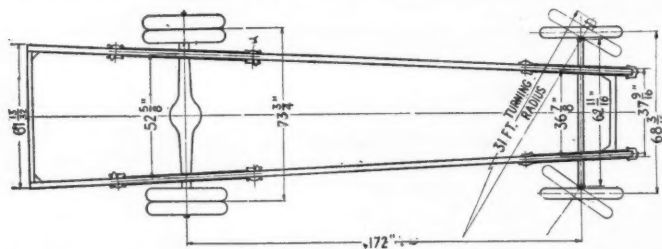


Fig. 5—Diagrammatic plan view of the type J chassis, showing major dimensions, relative position of frame, springs, wheels and axles

hand brake lever. It should be positioned so that it can be grasped firmly without moving the body out of the normal seated position. We believe the best practice is to have the lever arranged for a push and not a pull-on. Time can thus be saved, and a fraction of a second is often the determining factor from an accident prevention standpoint.

The brakes of a bus must be free from undue noises such as squeals or rattles. This involves, among other matters, the use of special brake drum material. The conventional soft pressed steel is practically useless. The best plan is to employ treated steel forgings or, failing in this, steel castings with a high carbon content.

The friction surfaces must have long life, and the adjustment be such that no tools or special skill are necessary. We attach considerable importance to the matter of foolproof adjustment. The J system employs two vise-like levers. The outside controls the hand, the inside the foot brake. One turn is usually sufficient. If by any chance the levers are not returned to the vertical they will automatically reach this position by force of gravity.

The braking action must not be too abrupt. It must be positive yet not sudden and violent, for such a condition is exceedingly severe on the driving members, tires and body. It is also a frequent source of accidents from which serious claims may result. Excessively efficient brakes have a most marked influence on tire wear. It may be said that tire wear is almost directly proportionate to the effectiveness of the brakes.

Maximum Speed

In bus operation it is desirable from every point of view to cover the route as quickly as safety will permit. In this manner the maximum number of passengers can be carried daily. With a fixed maximum speed, this means fast deceleration and acceleration. Expressed in another way, the problem is to move from a stop in one location to a stop in another in the least time. In our own service this must be done without exceeding a speed of 15 m.p.h., or accelerating or decelerating faster than 2 m.p.h. per sec. A still more rapid rate of deceleration is, of course, available for emergency, but it will be uncomfortable and unsafe, especially for standees.

The acceleration and deceleration graph as reproduced in Fig. 6 shows how closely the present type of equipment approaches this conception. But in connection with a study of this graph, the following points should be kept in mind:

- (1) The bus was fully laden.
- (2) The test was carried out where traffic is not heavy.
- (3) Normal service conditions were followed, no attempt being made to obtain maximum acceleration or deceleration.
- (4) The bus was selected at random. Apparently the vehicle was below standard from the viewpoint of pulling power.

One of the great advantages of a bus over any other form of transportation unit is its flexibility. A bus can be switched around at any point, and it is highly desirable that it should be able to make a complete turn in the average thoroughfare without backing, for the latter practice if followed in congested areas merely adds to both confusion and congestion. There is also a marked possibility of an increased number of accidents.

A short turning radius is dependent on the interference of the tires with the drag-link, front springs or

frame, when the wheels are turned at the maximum angle. The controlling elements are wheel-spring tracks and wheelbase. As the radius of the steering angle equals the wheelbase divided by the size of the front wheel lock angle, it can be seen that a wheelbase of reasonable length is important to secure a short turning radius.

From the viewpoint of safety, the design features dictated by humane considerations are:

- (1) Easy steering.
- (2) Clear vision for driver.
- (3) Comfort and convenience for driver.

The steering of a bus should be at least as easy as that of the average automobile. To operate a stiff steering-gear is a hardship that certainly should not be inflicted upon the driver of a public service vehicle. A driver's energy and effort must be concentrated on his regular duties, and if he becomes fatigued through the expenditure of unnecessary effort, faulty operation is bound to result. This renders accidents more likely. Tests have convinced us that the actual physical labor imposed on the driver of a bus in connection with the manipulation of a steering wheel represents by far the greater proportion of the sum total of his work.

Easy Steering

Ease of steering is controlled by the total ratios between the hand and road wheels. Naturally frictional losses in the steering gear box and steering knuckles are of importance. Minimum losses in these respects are dependent upon the use of properly lubricated anti-friction bearings. Another very important matter is that the steering knuckle pins should lie in the vertical plane; otherwise there will always be a tendency to lift the front end of the bus when turning the steering wheel. An angle in either the longitudinal or transverse plane will cause lifting at the expense of effort on the part of the driver.

It is highly desirable that there should be an absence of shocks at the steering wheel. This is largely controlled by the total ratio, but also by the distance between the point of contact of the wheel with the road and the intersection of the knuckle center-line and the road. Every effort should be made to keep this distance small. With the J type the length of the lever arm is about $2\frac{3}{4}$ in.; and an increase of only 1 in. would decrease the total ratio some 36 per cent. This is the only point in the steering linkage where a change increasing the total reduction does not result in increased steering wheel travel for a given lock. A short drag link or the incorrect alignment of the

TYPE	"A"	"L"	"J"
Ratio	9:1	10:1	12:1
A	18	18	18
B	9	9	10
C	$8\frac{1}{2}$	$8\frac{1}{2}$	7
D	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$
TOTAL RATIO	594:1	568:1	55:1

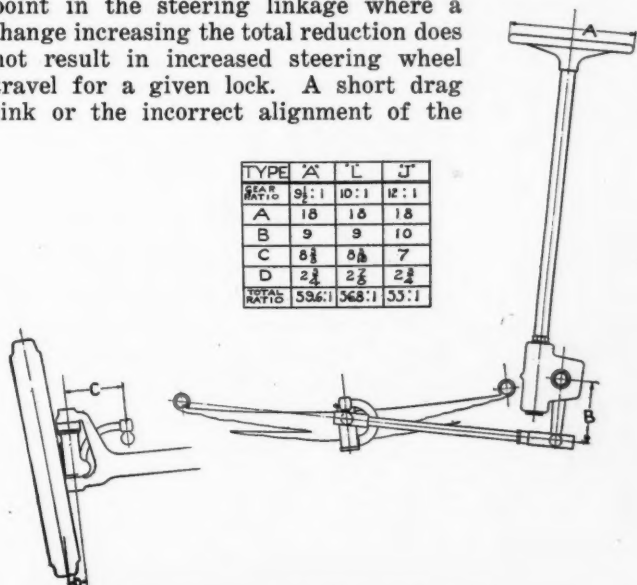


Fig. 7—Diagram showing important dimensions which affect ease of steering

drag link with the front springs will also result in shocks at the steering wheel when passing over rough roads.

Minimum steering wheel travel is important as it makes a change of hand position unnecessary for ordinary driving. It also decreases the apparent backlash, which is present in all steering mechanisms. The steering wheel travel is roughly inversely proportional to the total ratio, which is kept as low as possible for this

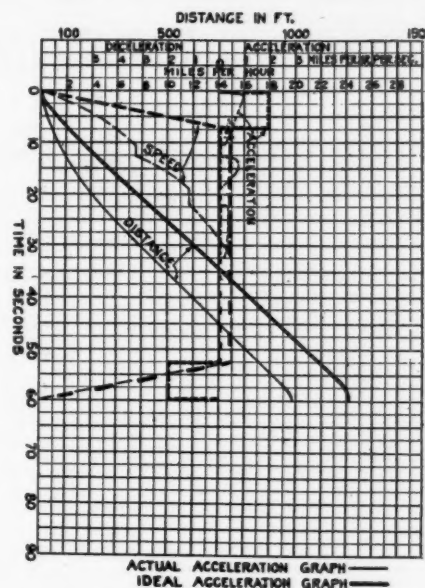


Fig. 6—Curves showing rate of acceleration and deceleration of L-type bus

reason. Our practice so far as the important dimensions referred to above are concerned may readily be followed from an examination of the diagram of steering leverages as illustrated in Fig. 7.

The driver should be located close to the left side of the vehicle. This permits him to observe and also to signal his intentions to oncoming traffic. There should be absolutely nothing obstructing his view. He should face clear glass. It should also be mentioned that with single-deck vehicles the placing of the driver well over on the left side provides for the very necessary boarding and alighting space for passengers and adequate room for operation of door.

Briefly, a driver's vision should be such that when seated, even back of a closed windshield, he will have nothing on which he can readily concentrate his gaze, no vertical posts or obstructions of any kind. He should just naturally sense that he is in the open.

From the viewpoint of design, it is essential that consideration be paid to the attitude of the public as a

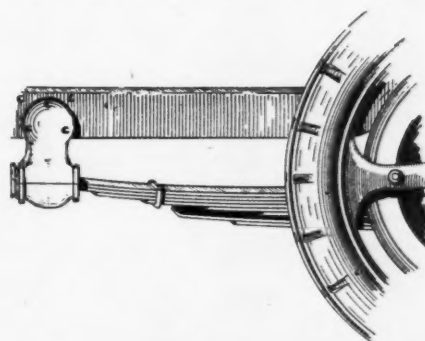


Fig. 8—Progressive type of spring intended to afford good riding qualities at both light and heavy loads

whole. It is not enough to consider only the attitude of the actual riders; regarding the matter of comfort from these somewhat different angles, it is necessary that attention be given to:

- (1) Ridability.
- (2) Reliability.
- (3) Silence of operation.
- (4) Smoothness of starting and stopping.

Broadly, ridability is a matter of proper spring-design. There are, however, other important influences; the wide

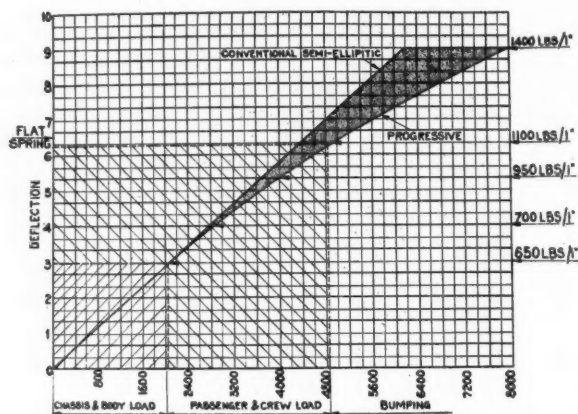


Fig. 9—Rear spring deflection curves for progressive and non-progressive or conventional types of spring

frame, track and spring centers bear materially upon this question, for the nearer the wheels are to the outer edge of the body, the less will be the movement to which passengers must be subject when obstacles are passed over. Again, with the wider track, many of the ruts and depressions created by vehicles of narrower gage, will be passed by. Incidentally, this is quite an important matter from the standpoint of road wear. The wide track also diminishes the wheel house projection inside of body. The modern tendency is to employ cross seats and with the narrow gage vehicle the wheel houses are a source of much discomfort to those seated upon the inside immediately over them. A rigid frame, correct axle load distribution and minimum overhang are all factors that make for better riding performance.

Apart from the points briefly touched upon above, the controlling factor from the standpoint of ridability is, of course, the design of the suspension itself. Obviously, the difficulty is to obtain good riding under all conditions of load. Spring design is always a compromise; a

spring must be able to withstand maximum load, yet vehicles are expected to ride reasonably well when light. As a matter of fact, they seldom, if ever, do so. In general, more damage is done to vehicles when running light than heavy because the riding properties under these circumstances are at their worst and the speed too often is high. Under conditions of heavy load, springs function best, and at the same time there is less likelihood of excess speed.

We believe that the answer will be found largely in the employment of what we term the progressive spring as illustrated in Fig. 8. It will be seen that spring is split into two parts. The top half takes the weight of vehicle, body and a certain proportion of load. The bottom part or helper, comes into action progressively. The top part must make a rolling contact with the bottom. One of the great advantages of this system is the fact that for no additional cost or weight, a marked improvement in performance is possible. The theory behind our choice of the progressive spring and the advantages that may be derived from its employment can readily be seen from an examination of the rear-spring deflection curve for both the progressive and the conventional semi-elliptic designs reproduced in Fig. 9. No doubt it will be appreciated that to secure comfortable riding with a small number of passengers, it is necessary to have a spring of not over 670-lb. per in. deflection. But a spring having these characteristics is not a practical arrangement, for the result would be too great a difference in body and step height between the minimum and maximum number of passengers. This point is clearly shown in the graph where the proportion of the 51-passenger load equals 28,000 lb. per rear spring, from which the comparative figures given in Table 1 are deduced.

TABLE 1—DEFLECTION FOR PASSENGER LOAD

	Conventional Semi-elliptic Spring	Pro- gressive Spring
Full passenger-load	4¾	3¾
Maximum bumping-load	8½	6¾

The deflection curve of a simple semi-elliptic spring is a straight line showing a constant load per inch. But as the progressive element comes into play gradually, a curve is apparent. The departure from a straight line which is shown shaded represents the load carried by the progressive element which can be designed to come into action at any desired point. It has been found most satisfactory to design this spring so that the stiffened action begins very gradually, that is to say, after a limited number of passengers have been taken on. Obviously, as the progressive element comes into action, there is a gain in the stability of the vehicle.

From the graph above referred to it is exceedingly interesting to note the change in rate of progression as a result of a variation in passenger load. The figures based on increments of 10 passengers given in Table 2 bring this point out in a striking manner.

TABLE 2—CHANGE IN RATE OF PROGRESSION FOR VARIATIONS IN LOAD

No. of Passengers	Load per 1 in. Deflection, lb.	Increased Stiffness, per cent
0	670	0.0
10	780	16.4
20	810	20.9
30	850	26.9
40	900	34.4
50	1,080	61.3

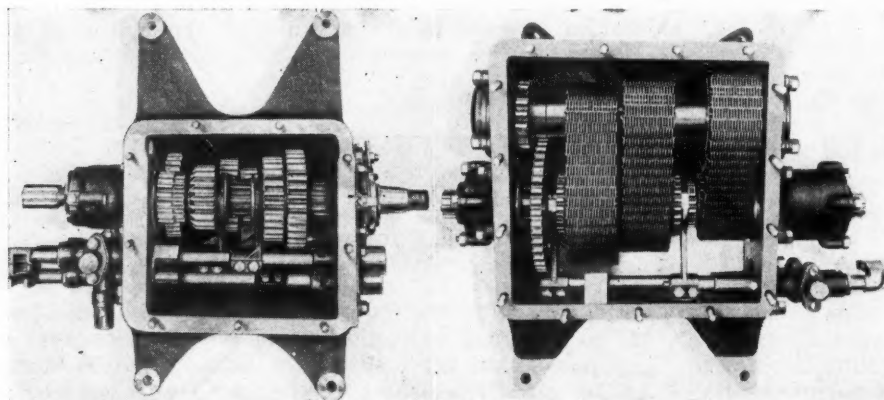


Fig. 10 (left)—Four-speed gearset, used on some chassis built by the Fifth Avenue Coach Co. Fig. 11 (right)—Three-speed chain transmission used on other chassis of same make

For our single-deck equipment we have standardized the Mack type of rubber shock-insulator. We are experimenting with this device for our double-deck vehicle, but as yet are not prepared to state the results. This arrangement, in conjunction with our progressive system, markedly improves the riding conditions. It also avoids the necessity for lubrication and for replacement of shackles, shackle-pins and bushings; also, no spring-eyes are required. Experience up to the present shows that we may expect a very satisfactory life from rubber blocks.

Silence of Operation

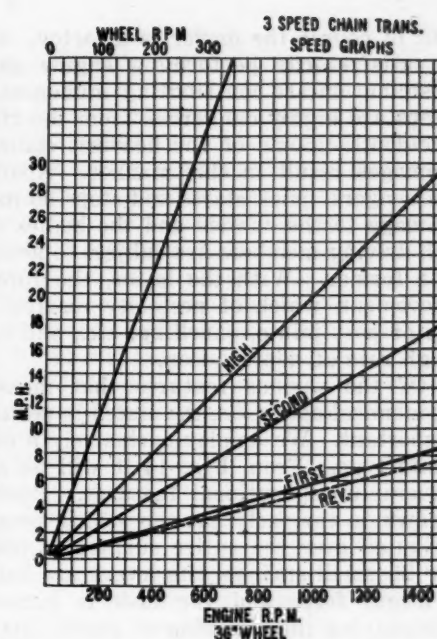
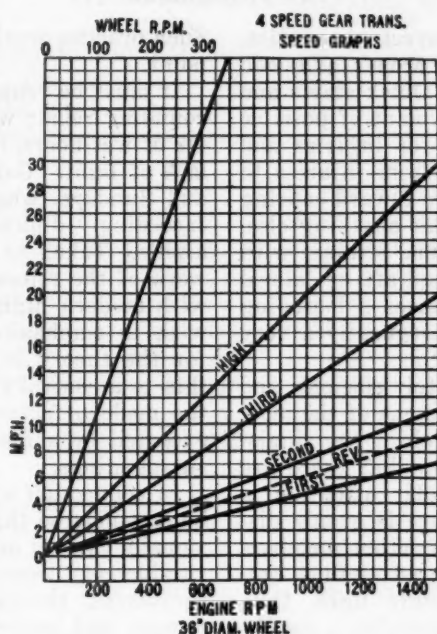
It is a problem to produce a silent vehicle. It is doubly difficult to retain this state throughout the life of the vehicle. Silence necessitates freedom from engine vibration, quiet transmission gears, evenly stepped gears, a quiet rear end, and generally the elimination of all rattles and squeaks from both body and chassis. To attain this, every detail of design must receive the most minute care. Silent operation is necessary in crowded thoroughfares, and certainly the people demand this condition in the residential areas, particularly at night when the streets are comparatively empty and noises become automatically emphasized. As a rule, noises are tolerated simply because such things are nearly always with us, but in the quiet of the evening sounds that ordinarily pass unnoticed become startlingly evident. In connection with the general question of noise it is interesting to consider for a moment conditions on Fifth Avenue, New York, in the rush period during which we operate 180 buses per hr. in each direction. If this vehicular volume were not reasonably quiet, we should soon be ordered off the streets as a public nuisance and a menace to health.

From the standpoint of silence, our greatest difficulty has been and still is the matter of transmission gears. We employ a four-speed gear and three-speed chain transmission, shown in Figs. 10 and 11 respectively, depending upon the class of service and general operating conditions.

The shift-rods, their bearings and the lock mechanism are of substantial proportions.

The curves in Figs. 12 and 13 show that the ratios of the four-speed transmission are almost exactly in geometrical progression. The three-speed transmission is not so satisfactory in this respect, but here a compromise is of course necessary. This remark applies to all three-speed jobs. Where grades are severe, four speeds are highly desirable, to cut down ability losses to the minimum. But where roads are practically flat, the advantages of a four-speed transmission are not nearly so marked.

The silent-chain transmission is particularly useful for city service where there are frequent stops and starts, and where the percentage of direct-gear operation is relatively small. Substantially it is similar to a constant-mesh gear transmission but chains are used in place of gears. The shift is extremely short and very easy to effect. Such transmissions remain quiet throughout their useful life, and from our observation one can expect at least a year's service from the chains, which are cheaper to replace than gears. Chain transmissions are standard practice for London bus service.



Figs. 12 and 13—Curves showing relation between engine and vehicle speed on various gears in the four-speed (spur) gearset and the three-speed chain transmission

The entire design of a bus must be predicated on ability to give uninterrupted service between clearly defined periods, preferably based on mileage. The ability of a bus to fulfill this requirement with particular reference to the duration of period will at once determine the utility of the design. The public will not long tolerate an unreliable service. Failures with an automobile cause confusion enough, but the number of persons involved as compared with a bus is relatively insignificant.

One point it is especially desired to bring home is that under average conditions, drivers cannot be expected to make any attempt whatever to spare their equipment. All

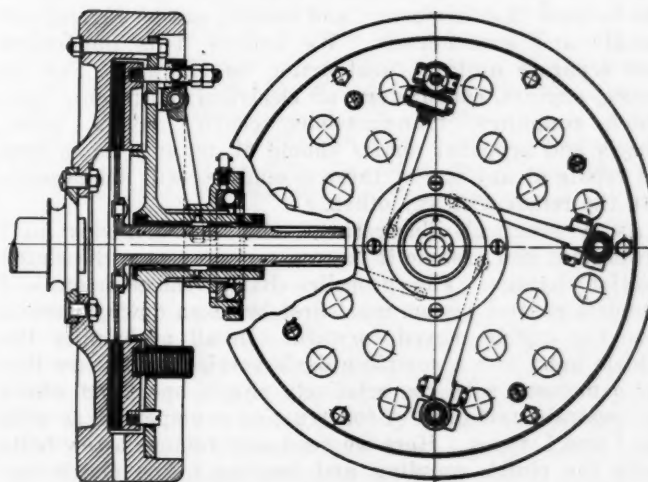


Fig. 14—The single-plate clutch used in all Fifth Avenue Coach Co. chassis

they are concerned with is stopping for passengers, avoiding accidents and keeping in their places on the road in accordance with their schedule. Everything must be subordinated to these three things, and in cases where vehicles cannot stand up under such conditions, either the required changes must be made to enable them to do so or they should be scrapped, for assuredly they have no place in the operation of a public utility.

Smoothness of starting is primarily a clutch function,

but of course the driver is a factor. Correct gear-ratios, a satisfactorily performing engine and proper axle-load distribution are contributing influences. Quick starts and stops are highly dangerous from the viewpoint of possible accidents. Some of the heaviest claims for injuries and damages result in this manner. Apart from injuries to passengers, quick starts and stops do more toward causing damage to the chassis and the bodies than anything else. All driving members are subject to abnormal stresses with the former. With the latter, the fore-and-aft or lateral movement, which of necessity results, causes a loosening up of post joints, panelling, etc., and consequently a very high rate of depreciation.

Of the various features that make for efficient and economical operation, the clutch is perhaps one of the most important. We employ exclusively a clutch of the single-plate type. From Fig. 14 it will be seen that there are several unconventional features. Particular attention is drawn to the fact that the spring pressure is evenly distributed over the entire surface of the friction members by 20 small springs, the levers are balanced against centrifugal force and the disk is exceedingly light, thus simplifying the changing of gears. Incidentally, a clutch-brake has been found unnecessary. The removal of the clutch body is an extremely simple operation, as is also the adjustment of the levers. Smoothness of stopping is discussed under the heading of Brakes.

Minimum operating cost demands:

- (1) Maximum accessibility
- (2) Minimum consumption of labor and material. This of course means excellence of both materials and workmanship
- (3) Minimum consumption of fuel
- (4) Minimum weight, particularly that which is unsprung
- (5) Maximum safe speed. This naturally comprehends rapid acceleration
- (6) Maximum tire-mileage

Maximum Accessibility

It is fundamentally necessary that the design of a motor-bus be such that inspection and repairs can be carried out quickly and economically. We believe it is imperative that separate unitary construction be followed. For instance, engines, carbureters, all electrical equipment, fans, clutch couplings, transmissions, control levers, axles, wheels and propeller shafts should all be entities so that the repair of any one of these assemblies will not necessitate the removal of any other.

As a practical illustration, take the orthodox unit powerplant and assume it is necessary to renew the clutch friction linings. The propeller-shaft, transmission and complete control system must first be taken down, possibly even the engine moved forward. In all probability the vehicle must lose a complete day's service. Compare this for a moment with the relatively simple operation where the separate-unit form of construction is employed, as with the J and L types. Here we need only remove a few bolts from the clutch coupling and housing. The clutch can then be taken out as a complete unit and the linings replaced within a period of 20 or 30 min.

The unitary system, if properly carried out, guarantees minimum loss of bus-hours, minimum operating cost, and minimum difficulties from the standpoint of training employees. Obviously, less skill is required on the part of mechanics where they are constantly performing the same operation; here it is simply a question of specialization. But where the construction is such that multi-repair operations are required, the situation is much more complicated. Summing up, to be obliged to remove several units before a faulty unit can be inspected, repaired or replaced, is a condition not to be considered for a moment.

Such practice would be ruinous from a public utility standpoint.

It must be remembered that the general conditions surrounding repair work are seldom ideal. There is the matter of wet floors, dirt surrounding the various units, often lack of light. Garage repair forces must work Saturdays and Sundays, which is not particularly attractive. It is exceedingly difficult to find men who are willing to work nights. Taken as a whole, the conditions surrounding the work of the repair-men seldom bear favorable comparison with modern high-class factory practice. Here again we wish to emphasize the desirability of unit construction, for the theory is to remove the defective unit and take this to a central repair plant having all the advantages of the modern factory, so that the repairs can be promptly executed by skilled men working under the best possible surroundings.

In connection with the matter of accessibility, it should be remembered that repairs and adjustments must be occasionally carried out at night, sometimes under most unfavorable conditions. Again, assuming the use of low-level equipment, the design should be such that inspections, repairs and renewals can in practically all instances be undertaken from the sides or underneath the vehicles. This means the use of pits. The practice of providing trap-doors inside buses is not desirable. Trap-doors weaken the bodies, are a possible source of accidents, cannot be kept tight in place, permit exhaust gases to leak through, and create undue noise. Experience has shown that it is highly unsatisfactory to carry out chassis repairs from the inside of the body. If this practice is indulged in, claims are bound to result from passengers due to their clothes coming into contact with grease or dirt. Mechanics are sometimes careless and this results in unnecessary damage to the interior fittings, particularly the seat cushions.

Minimum Consumption of Labor and Material

From a financial viewpoint, the success or failure of a utility operating buses depends upon the cumulative additions or subtractions of small amounts expended on either labor or material. Sometimes the items may appear insignificant but, taken as a whole and over lengthy periods, the story is entirely different. When working, a bus is a heavy consumer of both labor and material. The consumption is perhaps much greater than is generally supposed. To afford a practical illustration, Table 3 representing the actual consumption by our company of some of the major elements for the year 1921, may be of interest. These figures are based on the average of all buses.

TABLE 3—FIFTH AVENUE COACH CO.'S COST PER BUS FOR 1921

Gasoline		\$1,125.94
Lubrication		109.42
		284.34
Tires		
Repairs to Chassis	{ Labor \$676.97	1,436.78
	{ Material 759.81	
Repairs to Bodies	{ Labor 359.00	521.44
	{ Material 162.44	
Drivers		3,071.71
Conductors		2,692.48
Total		\$9,242.11

From a casual study of these data it will be seen that a relatively small percentage of saving, if applied to any of the items and then multiplied by a large number of vehicles, must total a vast sum annually. If one assumes that the equipment in question is of good design and that its maintenance is economically undertaken, then how much more important does this issue become when the reverse is true.

Perhaps it will not be out of place here to point out that the profit of the average utility expressed percentage-

wise, usually does not run beyond one figure, and that there are a vast number of utilities where the figure is in red. To change the color and to exceed the single-figure basis, requires all that is best in design, material, workmanship and operating care.

Minimum Consumption of Fuel

Aside from the human elements which have been covered in a previous paper, Motor-Bus Transportation, presented at the 1920 Semi-Annual Meeting, the major issue, of course, is the engine. We employ exclusively the sleeve-valve type. From our viewpoint this type possesses certain basic advantages which make for economy of operation.

First, taking the question of fuel, high gasoline-economy is possible due to

- (1) Absence of valve pockets and the spherically shaped combustion-chamber. Incidentally, this permits of high compression being employed.
- (2) Positive action of valves at all speeds. With poppet-valve engines, valves at high speeds tend to float due to weak or broken springs
- (3) Extraordinarily low friction-horsepower
- (4) Ideal location of the spark-plug

Next, there is the question of service. In this respect we believe the sleeve valve engine has the following advantages:

- (1) The performance remains reasonably constant throughout the useful life. It is not necessary to make adjustments constantly to permit of satisfactory and uniform behavior
- (2) Throughout the useful life the performance tends to improve
- (3) Practically no adjustments can be made since there is nothing to adjust. This alone represents a considerable saving in the garage force.
- (4) Throughout useful life there is little, if any, increase of noise due to wear
- (5) Cost of repairs is small since there are very few operations requiring skill
- (6) Cylinders never require reborings. This obviates the necessity of carrying in stock second-standard pistons and rings

The performance of a correctly designed engine is largely a function of its carbureter; therefore a wide variety of results is always obtainable with varied settings. The points which are brought out in Table 4 are of special interest.

TABLE 4—HORSEPOWER AND TORQUE DATA FOR TYPE-J BUS

Power Developed at 1000 R.P.M., hp.	36.2
Power Developed per cu. in. of Displacement, hp.	0.12
Weight of Vehicle per Horsepower, lb.	301
Weight of Vehicle per cu. in. of Displacement, lb.	36.2
Maximum Torque, lb.-ft.	194
Speed for Maximum Torque, R.P.M.	800
Decrease in Torque at 400 R.P.M., per cent.	5.1
Decrease in Torque at 1400 R.P.M., per cent.	11.9
Speed for Maximum Torque with a 5.4 to 1 Rear-Axle Ratio, m.p.h.	16.1

During 1921 our entire fleet of buses averaged 50.7 ton-miles per gal. The carbureter is of the Zenith type. There is no exterior adjustment. The throttle spindle is 7/16 in. in diameter, hardened and ground. There is a total of 4 in. spindle bearing-area. There is a gland with a suitable packing at the front end and a blank nut at the other. With the bus there is an abnormal amount of throttle movement, and unless this factor is taken into consideration from the standpoint of design, rapid spindle and bearing wear will take place. It will also be seen that the design is rugged throughout. All screws, nuts, plugs or unions are of ample size. The butterfly is exceedingly well fitted

and provision is made for a simple throttle-stop adjustment.

In the earlier days of bus operation the tire question was one of our chief anxieties. To-day the situation is very different, for wonderful improvements have been made in tire manufacturing methods. Of course, there is no sense in decreasing tire expenditures at the cost of the equipment generally. Resilient tires are essential and too great a wear must not be permitted. It is our regular practice to remove a tire immediately the rubber has worn to within 7/8 in. of the hard base.

In looking back over our records, it is extremely interesting to note that in 1911 our cost per mile for tires was 4.93 cents. From that date on, a steady reduction has been effected. The figure for 1921 was 0.87 cent per mile, and this, of course, includes the use of six tires. From our viewpoint the various factors which have permitted this condition to be reached are, in the order of their importance, as follows:

- (1) Better tire manufacturing methods
- (2) Improved vehicle design. This includes decreased weight, particularly unsprung weight, the substitution of metal for wood wheels, etc.
- (3) Closer supervision from an operating standpoint
- (4) Closer supervision from a maintenance standpoint

As the result of long experience in connection with the design, construction and operation of buses, we are convinced more than ever that trucks or automobiles, modified or unmodified, are absolutely incapable of giving satisfactory and economical service if operated as buses. The tendency to-day is to employ trucks or automobile chassis as buses, or to attempt to modify their construction, then to re-christen them. This is a dangerous policy from the standpoint of both the builder and the user, and eventually it must surely result in dissatisfaction and disillusionment to all parties.

There is another and very important matter: We must not lose sight of the fact that the bus has not made good in some of the localities where it has been tried out. We are constantly confronted with failures such as those at Des Moines, Toledo, Kansas City and other cities. Such failures, when analyzed, invariably point to the fact that the combination of extemporized equipment, indiscriminate operation, overloading and lack of experience is responsible. But these failures can be avoided, and the automotive industry in its own interest should do all that is possible to guard against such occurrences.

Bus Standardization

It seems scarcely necessary here to comment upon the splendid achievements of the Society in connection with standardization work in general. Certainly, this has been a controlling influence in the development of the automotive industry. We believe much would be gained if it should now concentrate upon the motorbus. What we have in mind is the standardization of certain of the main dimensions; for example, front and rear-axle tracks, spring center-to-center distances, frame width, dimension between dash and wheel pocket, seat dimensions, aisle widths, etc., for the various classes of service.

The main object of this paper is to bring to the attention of interested parties in a clearcut, vigorous and interesting manner, the fact that to produce motorbus chassis that can be operated efficiently and economically, a very close study must be made of the entire situation. It is also desired to destroy as far as possible the illusion that a bus chassis is merely a modified truck. If in these things, even a moderate degree of success is achieved, we shall feel amply repaid for our efforts.

The matter of body design has not been touched upon since this is a subject that, because of its magnitude, must receive separate treatment.

S. A. E. Summer Meeting

Can Less Volatile Motor Fuels Be Used Successfully?

Proper fuel preparation prior to combustion involves formation of a continuously homogeneous mixture without liquid film or drops at lowest possible temperature. Advantages and disadvantages of present methods of heat application are herein discussed

By F. C. Mock and M. E. Chandler*

MANY 1922 model cars have operated satisfactorily with the motor fuels at present in use, both in summer and in winter, but many have not. We are convinced that it is possible to operate better a number of cars that are considered satisfactory to-day with kerosene, mixtures of gasoline and some heavier oils, combined with alcohol, benzol or other "anti-knock" components, than with gasoline. The sole requirement would be the proper preparation of the fuel in the manifold.

The requirements of proper fuel preparation are

- (1) A thoroughly and continuously homogeneous mixture of fuel and air with no drops or liquid film wall flow to the valve ports
- (2) The charge temperature should be the minimum possible while complying with requirement (1).
- (3) The provision for a prompt change in the rate of action under changes of load and speed.

A cylinder charge of fuel is only a medium-sized drop. Any one who has observed through glass manifold sections, the storm of drops that is usually present, can easily appreciate the importance of this point. All the oil dilution in the crankcase is due, of course, to the introduction into the combustion-chamber of fuel that is not burned later. I believe that a large part of the rapid carbon formation, characteristic of engines having poor distribution, is due to the cracking, without burning, of the drops of excess fuel that occasionally enter the cylinders. It is evidently desirable to prevent liquid gasoline from reaching the cylinders after the use of a primer or choke means of starting.

If we consider as our objective a minimum temperature of the dry mixture, that is, a mixture of transparent fuel-vapor and air, it is immaterial, in theory, whether the heat is applied first to the fuel or to the air. If, however, we accept what our experiments have apparently demonstrated, that is, that a fog mixture of condensed vapor and air is satisfactory, provided the cylinder temperatures are such as to change this fog to a vapor before the end of the compression stroke, we shall find, both in theory and in practice, that the minimum temperature that can be used will vary with different

methods of heat application. The theoretical considerations involved are, we hope, clearly shown by an analysis of the known and available methods of heat application. These have been classified as follows:

Case 1—The heat imparted to the mixture through the medium of the air, by the communication of heat from the manifold walls to the air and to such part of the fuel as has been deposited on the manifold walls. This is considered to involve only the production of a dry-vapor mixture. An interesting variation of this is shown as Case 1b, where part of the preheating of the air is accomplished by subtracting heat from the air and the vapor mixture already formed, thus giving a fog mixture.

Case 2—The application of heat first to the fuel alone, with the resulting condensation of the vapor when it joins the main air-column; this results in a fog mixture.

Case 2a—Heating the fuel and a part of the air to generate a rich dry-vapor mixture, which is then condensed as it enters the stream of the remaining air-supply. This also gives a fog mixture.

Case 3—Directing a spray of atomized fuel and air against a heated surface. One result obtained with this construction is the breaking up of the spray drops into even smaller drops in the so-called "spheroidal" condition; the mixture thus formed cannot be properly designated as a fog mixture.

This classification has been made on a functional rather than a structural basis. Most of the hot-spot constructions in actual use employ two, and sometimes three, of these heating methods, but for analysis the distinction we have made seemed necessary. Consideration of the direct application of heat to the fuel has been purposely limited to designs in which the fuel has been previously metered in a liquid state, as doing so after heating has not thus far been demonstrated as practicable.

THE computation of the mixture-temperatures is based upon the methods used and determinations made by Professor R. E. Wilson. The gasoline values used are those of the high end-point gasoline referred to in Professor Wilson's discussion.† This gasoline, by the way, is apparently quite similar to the "D" gasoline of the fuel research consumption test recently concluded.

*Members engineering staff, Stromberg Motor Devices Co. Condensed from a paper presented at semi-annual meeting of the S. A. E.

†See AUTOMOTIVE INDUSTRIES, June 8, 1922.

In Case 1 the air charge receives a heat supply such that after the latent heat of evaporation has been supplied to the fuel, the resulting mixture will have the minimum temperature of a dry vapor. A typical construction is shown in Fig. 1. Its practical equivalent, the application of heat to the air charge before it enters the carbureter, is shown in Fig. 2. With the complete evaporation of a 15 to 1 mixture of the high end point gasoline measured by Professor Wilson and, ignoring the heating of a small amount of fuel on the walls, this would involve air entering the carbureter at 154 deg. Fahr. with a resulting mixture temperature of 135 deg. Fahr. For the kerosene measured by Professor Wilson, the air would have to enter the carbureter at 287 deg. Fahr. with a final mixture temperature of 230 deg. Fahr.

In practice, however, dry mixtures are not realized at such low temperatures, for the reason that only part of the hot air comes into contact with the fuel. Within a short distance from the carbureter jet the tiny drops of fuel spray take up a velocity and direction identical with that of the air which bears them and thenceforth until they strike a wall, they generally are surrounded by a miniature atmosphere of vapor at the dew point. Fuel that travels along the walls comes into actual contact with only a thin film of air. We have endeavored by various means to create a turbulence that would accelerate and decelerate the spray droplets in the air medium that carries them, but every effort of this kind has resulted in increased deposition of fuel on the manifold wall and has made conditions worse than before. The temperatures actually existing in practice are more nearly those that would result if the fuel came into heat conducting contact with but one-half to one-third the air charge during the travel through the intake manifold. On such a basis the average temperature of the mixture is considerably higher, for instance, with a 15-to-1 dry mixture, and, as the fuel receives heat from one-half the air, the final average temperature will approximate 160 deg. Fahr. with gasoline and 273 deg. Fahr. with kerosene, as is brought out in Table 1.

On account of the high heat capacity of dry mixture charges formed in this way, there being no cooling from any further evaporation of the fuel during the compression stroke, the tendency toward detonation should be, and apparently is, greater with this method of fuel preparation than with most others. Due to the relatively slow heat transfer, more than the customary difficulty is experienced during changes of engine speed and load. The proper functioning of a device of this kind is contingent upon the maintenance of adequate temperatures; but in actual practice such temperature regulation is disturbed by a number of factors, depending upon seasonal and climatic conditions, as will be explained later. Since the mixture-temperature depends upon that of the air entering the carbureter, which in most cars depends in turn upon the temperature of the cooling water and of the whole mass of metal under the hood, there is a long duration of "warming-up" which can be taken care of only by elaborate thermostatic devices. A factor of safety, to provide for the occasional use of fuels heavier than the average, can be obtained only by raising still far-

ther the temperature of the fuel charge of normal operation. More important is the fact that there is nothing to prevent raw gasoline entering the cylinders during the starting and warming up period and probably also during normal running.

In Case 1b, Fig. 3, the fuel vapor is formed as in Case 1, but a smaller exhaust air-heater is used. The air entering the intake system, before it reaches the exhaust heater, is used to cool and condense to a fog the dry mixture coming from the carbureter. The temperatures of the air entering the carbureter and of the mixture leaving the carbureter are the same as in Case No. 1, but the final mixture-temperature in the intake manifold, if a complete heat-transfer could be established,

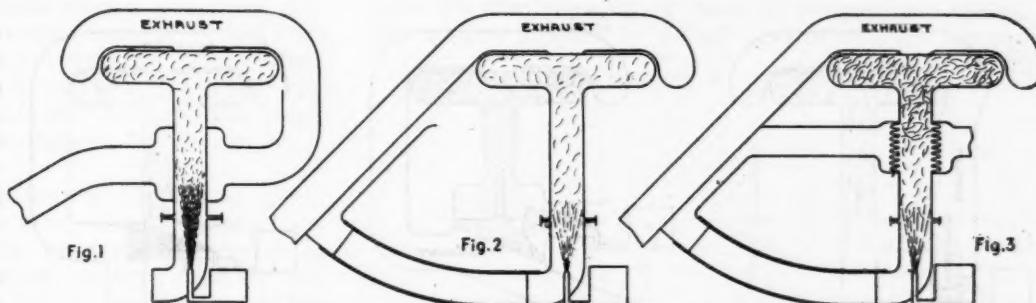


Fig. 1 (Case 1) Heat applied directly to air through contact with manifold walls.

Fig. 2 (Case 1-a) Heat applied to air only before it enters carburetor

Fig. 3 (Case 1-b) Part of initial heat application obtained by cooling vapor mixture sufficiently to form a fog

would be considerably lower than in Case 1; for instance, 122 deg. Fahr. with gasoline as against 160, and 188 deg. Fahr. with kerosene as against 273. But we do not believe that in practice the addition of this condensing device would be of value. If made elaborately enough to accomplish the desired heat transfer, it would probably increase the amount of fuel on the walls and require a still higher temperature of the air entering the carbureter. It would also increase the difficulties of acceleration and the "loading" in the intake manifold while the engine is cold.

IN this method, which is shown in Fig. 4, the fuel, after being metered, is discharged into a heating chamber which the air charge does not enter; the vapor formed here is then mixed with the unheated air charge to form a true fog mixture. At first thought this system seems to be promising, but actually it has serious inherent disadvantages, for the reason that the delivery of vapor depends upon the temperature being kept above a certain minimum.

An open chamber will evaporate liquid below the boiling point much more quickly than a closed one, the difference being due solely to the more rapid escape of the vapor from the open chamber. In the design illustrated a normal flow of vapor from the heating chamber should take place only when the vapor temperature is raised to the final boiling point of the fuel; that is, the vapor must be between 400 and 500 deg. Fahr., which is much higher than the temperature needed with any other construction shown. The final temperature of the mixture may, however, be quite low because of the fact that very little more heat need be added to the system than is necessary to vaporize the fuel. Also, the "factor of safety" in heating capacity may be large without raising the final temperature of the mixture in proportion.

This arrangement might be hard to start and would possibly be slow on acceleration. With heavy fuels there would be a tendency for the heavy elements to collect in

the bottom of the heating chamber during idling, when the exhaust temperature is lower than the boiling point of the fuel. Upon a sudden increase of the exhaust temperature this pool of heavy elements is apt to coke. In fact, we have known of a number of instances where a pocket for the collection and heating of the fuel would fill with greasy tar or coke. This trouble was marked particularly in high end-point gasolines.

This construction has the additional advantage, when properly designed, of permitting no liquid fuel to reach the valve ports. On this account, as also with Case 2a, it will give a homogeneous fuel charge, or "good distribution," as we call it, with any shape of intake manifold and any convenient location of the carbureter.

Case 2a, Fig. 5, is a sort of compromise between Cases

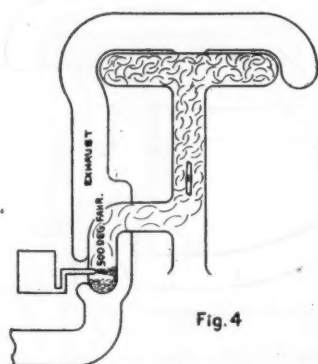


Fig. 4

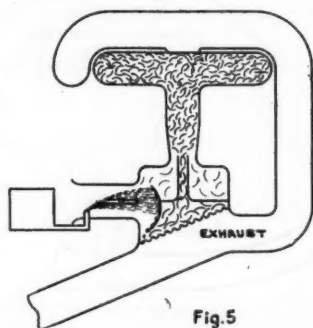


Fig. 5

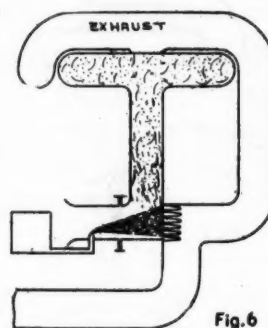


Fig. 6

Fig. 4 (Case 2) Heat applied direct to fuel of mixture charge

Fig. 5 (Case 2-a) Heat applied directly to main part of fuel and small part of air charge

Fig. 6 (Case 3) Fuel and air mixture sprayed against a hot surface

1, 2 and 3, which seems to possess all the advantages of Case 3 and fewer disadvantages. The mixture spray from the carbureter is thrown against a deflecting surface, that may be heated, and fuel not vaporized is thrown down into a heating chamber as in Case 2. An opportunity is afforded for the fuel to evaporate in and mingle with the air, before the separation of the liquid and the vaporized portion. This reduces the fuel lag on acceleration and also reduces the amount of fuel that must be taken into the heating chamber. An air circulation is maintained through the heating chamber, which helps to carry the vapor away as fast as it is formed; the action in the heating chamber then can be **evaporation** rather than **boiling** as in Case No. 2. This distinction is important because **boiling** implies the maintenance of temperature above a certain point, at all engine speeds and at a constant pressure, while **evaporation** can take place at any temperature and, fortunately, under a change of engine speed, the decrease of the exhaust temperature being accompanied by a reduction of the fuel feed and the rate of evaporation.

THE air taken through the heating chamber is, of course, highly heated, so that, as compared with Case 2, we have a small part of the fuel and of the air heated, to be cooled by the remainder of the air charge and a certain part of the fuel charge. The temperature balance would, of course, depend on the percentages of the fuel initially vaporized and of the air passed through the heating chamber.

This arrangement possesses the advantage of Case 2, in allowing a large reserve capacity for warming up without excessive heating of the mixture under normal operation, and also of preventing liquid fuel from going into the engine cylinders. A device of this sort, though of design entirely different from Fig. 5, has been used in the actual driving of a passenger car with a

six-cylinder engine and gave as good a demonstration on kerosene, with a benzol component to avoid detonation, and alcohol at a mixture-temperature of 120 to 140 deg. Fahr., as with gasoline. It was also found possible to use heavier fuel combinations which resulted in considerably better operation than that shown by the average car in the hands of its owner. Starting on gasoline in very cold weather was not more difficult than with the ordinary carbureter and intake-manifold arrangement. In fact, no difficulty was ever experienced in starting; the starter was always strong enough to turn the engine over. Closing the choke would always effect a start. On gasoline the warming-up was very good. In weather 10 deg. Fahr. above zero, it was necessary only to use the dash mixture control device for about $\frac{1}{2}$ min. or less after starting, after which it was possible to set all the controls in the normal driving position and drive away. This usually synchronized with the development of a mixture temperature of about 90 deg. Fahr. With gasoline the fuel consumption was but slightly lower than with a good carbureter on a conventional type of hot-spot intake manifold, but the engine would run smoothly on very lean mixtures and the weekly mileage, particularly in winter, was better. The smoothness and the absence of carbon, crankcase oil dilution and ignition trouble were marked. We found also improved operation at low speed on hills. The engine would pull smoothly and without apparent effort and maintain this smooth low speed pulling indefinitely.

As illustrated in Fig. 6, this includes a condition aimed at, and more or less realized, in many hot spots in use to-day. It is the general belief, perhaps, that the fuel spray strikes the heated surface, vaporizes, and then condenses in the airstream. More recent observations lead us to believe that very little of the fuel vaporizes on the heated surface. It seems rather that the sudden application of heat to one side of the drops of spray, as they strike the heated surface, relieves the surface tension that holds them in globular form and causes them to burst; meanwhile, if an air draft is present, the "spheroidal condition" keeps them from adhering to the heated surface. This belief was first suggested by the observation that large drops come off such a hot spot in a coarse spray, while small drops come off in a finer spray.

There is one interesting hypothesis of action under these conditions, the realization of which would give a fog mixture at very low temperatures that has a very simple structure. If the heating surface were of exactly the size and location to be wholly covered by the liquid of the fuel spray; if its heating capacity were such that it could vaporize all the fuel that strikes it; and if the scouring action of the air-draft across the heating surface were sufficient to carry away the vapor as fast as it was formed, it would be possible to produce the vapor at the relatively low temperature corresponding to a density of one-fifteenth to one-twelfth that of air; also, there should be little, if any, heat transmitted directly to the air from the heating surface. Under such conditions, which we believe can be realized only in theory, the mixture temperatures would be the minimum among all the

systems suggested for producing a fog mixture by external application of heat energy.

Fig. 7 is an effort to show the nature of such action, assuming complete evaporation at the surface. There is, first, near the surface, a film of liquid, or a layer of liquid drops. Just off the liquid film the greatest vapor-density occurs, but as the distance increases and the air begins to lower the temperature, the molecules will begin to gather in small drops, in the action that we term condensation. It is obvious that it would be impossible to bring all the air into such contact with the liquid film that the vapor would be swept away, and uniformly diffused, within a few molecule paths of the liquid film, and it is only under such a condition that the temperature balances of Fig. 6 could be obtained. But it also is clear that the more completely we can direct and diffuse the air charge on the heating surface in the conventional hot-spot design, the lower the temperature and density can be next the liquid film, the lower can be the temperature of the liquid film and the wall itself and the lower the final temperature of the charge.

REGARDLESS of the correctness of the theory of operation of this type of hot spot, there are several advantages and disadvantages in practice that should be pointed out. As already outlined, reserve capacity can be obtained only by making the surface larger. Also, there is no inherent characteristic of this arrangement that would prevent liquid fuel from going into the engine. The heat capacity of the wall of any structure that could be used would be sufficient to prevent any lag in acceleration, provided the carbureter were made to give a charge of slightly increased richness, with a fuel of graduated volatility.

In the quantitative computation of heat transfer, we first must take into account the very wide variations of temperature that the air charge and fuel supply undergo before they enter the intake manifold system. On account of the large range of variation of hood temperature, Fig. 8 is given as a rough indication of the various changes in temperature that a molecule of air undergoes in getting from the external atmosphere to the cylinder port, without purposeful application of heat to the intake charge, other than the commonly used hot air stove around the exhaust pipe. Starting from atmospheric temperature, the temperature of the air is raised between 30 and 60 deg. in passing through the radiator. It has been my observation that there is a greater difference between the motometer temperature and that of the external air in summer than in winter. There is sometimes an additional rise of temperature under the hood due to the radiation of heat from the engine. The rise of temperature from the hot air stove is presumably about the same in the summer and in the winter but on many cars an appreciable portion of the heat added by the stove in the winter is lost before it gets to the carbureter, because of the cooling effect of the fanblast of relatively cold air on a long length of flexible tubing. The temperature drop in the carbureter and the manifold due to vaporization is indeterminate, dependent upon the fuel, the temperature and the vacuum. In many cars the intake manifold is so close to the exhaust that under full load the temperature is raised considerably by the cross radiation. We have sometimes gained 3 to 4 hp. in a maximum of about 70, by cutting off this radiation with asbestos board.

Fig. 8 will give an idea of the range of natural temperature-variation with which our intake systems have had to deal. Between the temperature of the air entering the intake system just after starting in the winter and that during a long run in the summer, there easily

may be a difference of 120 deg. Fahr. Very few current applications of heat to the intake charge, by either hot air or hot spots, affect the temperature one-half this amount. Any effort to attain minimum charge temperatures in actual practice must include means for dealing with the natural temperature variation under the hood.

With heating methods that approximate Fig. 1, the heating surface should perhaps be in two sections, one of which is in action at all times, and the other of which may be thrown open to the exhaust, either by a seasonally regulated valve, or by the dash mixture control of the carbureter.

Arrangements such as that shown in Fig. 2 can be controlled within certain limits of temperature by using a hot air stove on the exhaust line that has at least three times the heat capacity of those in common use to-day, with a valve adapted to cut off part of this hot air and

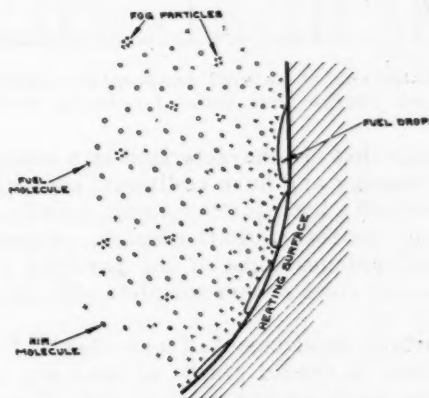


Fig. 7—Diagrammatic study of vaporization from a hot surface

admit cold air as the engine warms up. The regulation should preferably be automatic.

In the methods of Case 2, Figs. 4 and 5, no particular regulation for variation of atmospheric temperature is necessary. The heating action is almost independent of the outside temperature. With this type of construction, I have always recommended making the heater large enough so that cool air from outside the hood will be taken into the carbureter in the summer time.

Fig. 6, like Fig. 1, would perhaps be taken care of best by a regulable variation in hot spot area. Difficulty is experienced in practice in confining the heat to the region where it is desired. In warm weather the heat from the warm hood atmosphere tends to conduct across the flange junctions and through the walls of the heating chamber.

Homogeneous Mixture Quality

AS has been brought out in the foregoing, a homogeneous mixture requires a fine spray from the carbureter issuing directly into the heating region. If the fuel is allowed to condense or gather on the walls, it will reach the hot surface in waves and irregularly timed splashes, under which conditions the carbureter setting must always be somewhat rich, and many details of engine operation will suffer. Acceleration is always more difficult when there is a fuel lag between the carbureter and the heating surface.

The arrangement, common in many heavy duty engines, of locating the governor between the carbureter and the hot spot, is very bad. Everything indicates that the carbon deposit will be reduced to the minimum and crankcase oil dilution eliminated only when this custom is discarded and the carbureter is placed close to the hot-spot.

Several 1922 engines that have the property of operating very smoothly on extremely lean mixtures, have in-

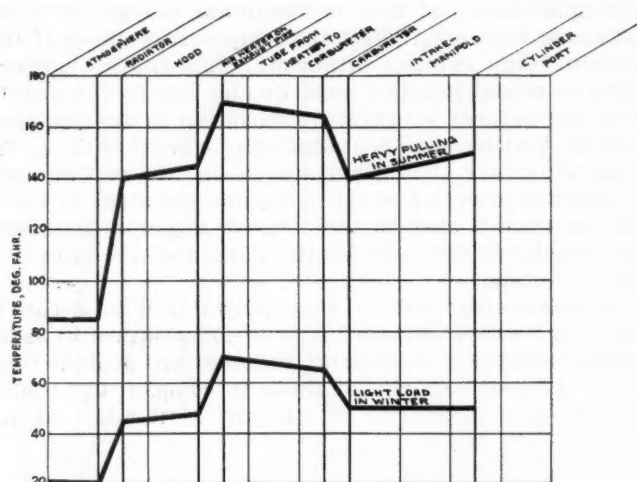


Fig. 8—Range of natural temperature variation of air charge from time of entering hood

take manifolds that are characterized by a hot-spot at the carburetor opening and have additional contact with the exhaust manifold a little farther along, usually at a point of division of the fore-and-aft reaches. Apparently the second "spot" catches some of the particles that elude the first one and gives a more complete and steady evaporation.

One important requirement of a successful fuel charge heater is that it should warm up and get underway quickly. The walls should be thin, and, if cast, should be lightly ribbed on the exhaust side. Aluminum combines low specific heat and rapid conduction and is a very suitable material for a cast hot spot heating surface, if there are no shielded parts that get so hot that they melt.

Preventing Liquid Fuel Reaching the Cylinder

It is recognized generally that it is desirable to prevent liquid fuel from reaching the cylinder and it has been claimed for many designs that they have this action. We have tried models of a number of them and have found that few impede the travel of liquid fuel to the cylinders in even a slight degree. With transversely ribbed elbows, for instance, the fuel drops are caught off the tips of the ribs by the air eddies and snatched through the elbow as if no ribs were present. This, of course, is with

air velocities above 70 ft. per sec., and part of the lively action naturally is due to the spheroidal condition already described.

We have used centrifugal force, surface tension and the force of gravity to separate the unvaporized drops. Careful combination of all seems to be required to achieve complete separation. A partial separation, which should be very effective at low engine speeds, can be obtained by abruptly increasing the manifold area above and beyond the hot spot. This would allow the heavy drops to settle down and again be hurled against the heating surface. The separation and recirculation would obviously be beneficial to the action of either Figs. 4 or 5, but the heat supply must be adequate or the fuel will not reach the engine, with an actually functioning liquid fuel separating device.

After watching the fuel, in an accumulation equal to many cylinder charges, bubbling, splashing, sometimes lying quiescent on the heating surface of glass-walled hot-spots, and sometimes swept through in a high-velocity spray, one fact stands out: the rate of fuel-feed from the manifold to the cylinder primarily governs the conditions of combustion, and the rate of fuel-feed to the manifold is an indirect rather than a direct controlling factor, as regards the mixture proportion of the charge actually used by the engine.

This point of view, we believe, is the proper one from which to consider the problem of the efficient use of fuel in our engines of to-day.

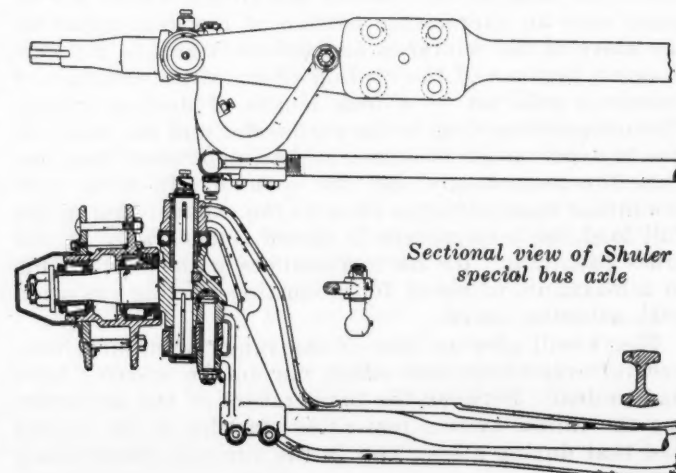
TABLE 1—FINAL AVERAGE MIXTURE TEMPERATURE WITH ENTERING AIR AND FUEL AT 75 DEG. FAHR.

Fuel	High End-Point Gasoline		Kerosene	
	12 to 1	15 to 1	12 to 1	15 to 1
Air-fuel ratio				
When heat is transferred from all the air to the fuel (Fig. 2)	145	135	240	230
When heat is transferred from one-half the air to the fuel (Fig. 2)	168	160	278	273
When heat is transferred from one-half the air to the fuel (Fig. 3)	132	122	193	188
When heat is applied directly to the fuel (Fig. 4)	143	132	174	159
When the fuel only is heated to temperature of required vapor density (Fig. 6)	98	92	124	116

Shuler Producing Special Bus Axle

THE tendency toward the use of wider and lower frames in bus chassis is being reflected in the parts market by announcement of axles designed especially for this class of service. Among recent developments in this field is the front axle now being produced by the Shuler Axle Co., a cut of which is shown here.

It will be noted that the spring pads in this axle are 7 in. below the center line of the wheel axis, while the cross link is arranged for a corresponding drop. Spring centers can be varied from a minimum of 28 in. to a maximum of 42 in. with a 64½ in. track. The axle center is of I-section drop forged from 30-40 carbon steel, heat-treated, while steering knuckles and arms are of S.A.E. 3135 chrome nickel steel. The knuckle pin is 3½ per cent nickel steel, hardened and ground, and a ball thrust bearing is fitted between the knuckle and upper yoke. All yoke eyes are bushed with hardened steel bushings. The wheel spindles are fitted with Timken bearings.



S. A. E. Summer Meeting

Widespread Use of Motor Bus

Great variation in conditions under which buses operate. California vehicles make 45 m.p.h. Country bus must carry both passengers and freight. State regulations very numerous. Future effect uncertain, but supervision now makes for better buses.

By R. E. Plimpton*

ANY division of the types of vehicle used for buses must be arbitrary, but for convenience we can consider them as applied in city, inter-city and country service. The city bus is designed for use on good pavements. The seating capacity is high, 20 or more passengers, but high speed is not essential. A maximum of 15 m.p.h. is often considered ample. Ability to thread through traffic and to move passengers quickly, on and off, is required. Ordinarily, overload capacity should be provided, so that standees can be accommodated during the rush hours.

The double-decker, a dense-traffic vehicle, has been developed highly through years of service in London and New York. The L-type bus of the Fifth Avenue Coach Co. is distinguished by the low floor, the first step being at the curb and only one other being required to reach the floor of the bus. Increased seating capacity, without any increase of weight, has been secured in many recent double-deckers. A sample now operated in Chicago seats 69 passengers, with a total vehicle weight of only 157 lb. per seat. Previously, about 200 lb. per seat had been considered good practice.

Covered upper decks have been tried out in New York City and Chicago, but have proved popular only in bad weather. Double-deckers in London, England and Toronto, Canada, have been fitted with blankets for each top-deck seat, in the effort to build up the load factor. The so-called double-single-decker has been tried in England; the entire top deck of this vehicle can be detached for winter service, the stairs being removed and the hatchway closed by a trapdoor. One vehicle of this type has a capacity of 29 passengers as a single-decker, and of 54 passengers, half below and half above, when both decks are in use. However, the single-decker has by far the largest field as a city bus.

Long Wheel-base

Long wheel-base to give loading capacity, a wide rear gage and a narrower gage on the front to give stability, a small turning-circle, low frame-height to give quick passenger movements as well as stability, long springs and special devices for easy riding are the more important features of a design that will be used widely in and about our cities.

It is of interest to know that experts on city transportation favor three sizes, for 21, 25 and 29 passengers,

with a maximum frame-height of 26 in. A smaller size, for 16 passengers, has also been proposed.

Most city buses have a central aisle, with cross-seats on each side. In a modified form the seats near the service door are of the longitudinal type, thus providing a space for standees or for those making short trips. This is being applied in short-haul work, while there is a tendency to use the unmodified cross-seat type in suburban work, and even for inter-city service.

The Inter-City Bus

The inter-city bus is smaller and faster than the city bus. From 12 to 20 seats are provided for the long runs, of 20 miles and upward. These vehicles are known as stages in the West and particularly in California, probably because of familiarity with the term to designate a horse-drawn omnibus. The stage usually is built with three or four rows of seats running all the way across the body, each having its own side doors. It resembles an enlarged touring car and, of course, that is what it frequently is. Comfortable riding is desired, rather than the ability to handle crowds. The floor level is kept as low as possible without decreasing the road clearance below 7 in. The center of gravity is kept down to eliminate sway and undue wear on tires and wheel bearings.

The average speed in Western inter-city service is high. Orders to drivers on a large system in California are to make 32 m.p.h. on well-paved highways and 35 m.p.h. is the legal speed limit. However, there are stretches where it is hard to keep down to this speed. For example, on the desert floor west of El Centro, Cal., a broad concrete pavement stretches away for 30 miles. There are no cross-roads and no habitations are in sight; there is no obstruction to view and very little traffic. With a high-powered car, the driver who will keep down to 35 m.p.h. is unusual. The actual speed over such stretches is from 40 to 45 m.p.h. and, occasionally, 50 m.p.h. The chassis and body should be of the minimum weight, consistent with long life and durability. The improvements being made in highway systems will, it is believed, lead to the use of even lighter chassis.

The stage used in the West is, as a rule, a rebuilt product. A high-grade touring car is bought second-hand, the frame is lengthened 4 to 5 ft., and a heavier differential, heavier springs and heavier tires are installed. It is realized that these vehicles are expensive, in both first and maintenance costs, since they are always in the "special" class, but Western operators have used them because they could not buy a chassis that would

*Associate editor, *Bus Transportation*. Excerpt from paper read before summer meeting of Society of Automotive Engineers.

carry the long bodies under the heavy-duty, up steep grades and at high speeds demanded by Western operating conditions. One design at least, that is included in Table 1, is now on the market, and there are indications that others will be available soon for inter-city service, not only on the Pacific Coast, but also in many other parts of the country where the large rebuilt touring car has been used heretofore.

The Country Bus

The country bus may start nowhere and end nowhere, as is said of some of them, but usually it runs through rural districts to a trading center or a point where connections can be made with some other form of transportation. This service does not require particularly high speed, but the bus should be able to keep going over poor roads, even when they are covered with mud or snow. Travel is light in this service; so the vehicles used are small. Touring cars of five and seven-passenger capacity may be operated when the roads are particularly bad, giving way to larger buses, up to 18-passenger capacity, during the summer months. One trip a day is often the custom, to town in the morning and returning in the middle of the afternoon. Thus, the operator has the time to pick up light freight for delivery along his route; or he may be a star-route contractor for the Post Office Department, in which case he may carry passengers and freight so long as his contract is properly performed. Therefore, the country bus should be built to carry both passengers and freight. Most operators seem to use the standard passenger vehicle, car or bus, and carry the packages inside or outside, wherever there is vacant space. A space for packages is placed at the front of the vehicle in some designs, with the rear given over to seats.

A convertible vehicle would be particularly useful in consolidated school service, where many buses are now operated only 3 or 4 hr. per day. The seats are removable in one design, so that the school bus can be changed quickly to a light delivery truck. Several combination bodies are on the market, designed to carry both passengers and express, but they have not been used to any extent by bus operators so far.

A transferable body has been suggested for school use, although it might be applied by the operator of country buses also. This would be mounted on a motor-vehicle chassis when the roads were good, but transferred to a horse-drawn vehicle, on wheels or runner, when they are impassable. The fact that this has been proposed seriously indicates the need for properly designed country buses. The field for them is enormous, and it should be possible to provide operators with a light, sturdy, economical bus for use during the 12 months of the year. Some engineers contend that good roads must come first. Yet bus service is being given on thousands of miles of unimproved roads. The life of the vehicles used is short, and some operators believe it economical to turn them in yearly for new ones. Here is a real problem waiting for automotive engineers to solve. The bus for city service is receiving attention from a large number of sources,

but its country cousin is, as yet, almost entirely neglected.

Before taking up the details of chassis and body used for the standard gasoline bus, other types that have been applied will be noticed. The gasoline-electric bus is used commercially in England, some 175 of the Tillington-Stevens chassis being operated in London, and others in the smaller towns. This consists of a gasoline engine direct-connected to a dynamo. The latter is electrically connected to an electric motor, which drives a worm rear-axle through a propeller-shaft. The control is by a speed regulator of the multiple-contact type, operated by varying the resistance in the shunt field of the dynamo, and by shunting the series field of the electric motor.

Storage-battery buses are used in Chicago for carrying passengers between the railroad depots and the department stores. One street railway is now trying out a battery vehicle in short-haul feeder service. This bus is fitted with pneumatic tires and makes about 18 m.p.h. in ordinary operation. The limited speed and battery capacity have worked against the battery-driven vehicles, although they undoubtedly have a field for short runs on good pavements.

The trolley bus shown, a road vehicle using the overhead system of the electric railway, is making headway in this country, as shown by recent installations in Toronto, Canada; Minneapolis, Minn.; and Los Angeles, Cal. The system on Staten Island, N. Y., is to be extended by the use of 15 trolley buses now ordered for the New York City Department of Plant and Structures. Some of these will be used on the City Island line, in the Borough of the Bronx, New York.

Many of the trolley buses look like rail cars fitted with rubber tires. However, there has been a tendency of late to follow closely gasoline vehicle design, thus using standard parts and making it possible to change from one type to the other by installing a gasoline engine and transmission apparatus.

A front-drive design has been worked out for the buses used in Leeds, England. The electric motors are under the front, and can be removed for repairs. It is claimed that this construction improves adhesion and traction effort, reduces the consumption of electric energy and makes possible a 14-in. floor level.

Steam Buses

The steam-propelled bus is not in commercial operation at present, although several experimental vehicles are being developed for such service. The Clarkson steam buses, which were popular in London because of their speed, quietness and ease of control, stopped operation in 1919, mainly, it is said, because of the increase in fuel cost.

Laws and ordinances by the hundred, almost by the thousand, have been passed to "supervise and regulate" the bus. The safety and comfort of the traveling public are protected by a host of these regulations, many of which are more honored in the breach than in the observance. In common with other users of motor vehicles, the bus operator is limited as to weight, dimensions and

THE automotive manufacturer is the logical maker of bus equipment. The market for vehicles of this kind is growing and in the future is likely to be very extensive. The type of vehicle exactly suited for bus work, however, is still a subject for discussion.

Many motor buses are already operating throughout the United States. They differ both as to design and performance. The tasks they have to perform are quite different in different localities. But they are showing the important place that the motor bus can play in economical transportation.

speeds. In addition, he often must pay special taxes that influence the type of equipment.

To assure safe operation, presumably, the carrying capacity of the bus is limited. In some States, in New Hampshire, for example, the manufacturer's rating is taken as the legal limit, and no standees are permitted. New Jersey allows 50 per cent of the seating capacity to be carried as standees. Connecticut allows two more than the number of seats provided. The District of Columbia permits one standing passenger for each 1.5 sq. ft. of floor area, this being calculated on the area remaining after deducting the space occupied by seats and 10-in. knee-room for longitudinal seats. In Maryland the maximum carrying capacity is the total length of seats divided by 16, except when the result exceeds the carrying capacity. This method, in effect, bars out standees.

An emergency door that can be opened from the inside in case of accident is required in a number of localities. Other equipment insisted upon, for safety reasons, includes speedometers, inside lights, extra tires, skid chains, warning device and a fire protection device.

The requirements for heating, lighting and ventilation are usually indefinite; when enforced they depend upon the interpretation of the authorities. Closed buses in

the District of Columbia must have a minimum temperature of 40 deg. Fahr. between Nov. 1 and April 1. Interior lights, of 2 cp. or more, are demanded in Ohio and other States. In Maryland each bus must have two ventilators.

In many States the taxes are based upon seating capacity, and the larger vehicles pay more per seat than the smaller. Florida exacts from the buses used as common carriers a fee of \$5 per seat for 7-passenger or less capacity, \$7.50 per seat for 7 to 17-passenger capacity, and \$10 per seat for more than 17-passenger capacity; in addition there is a tax of 75 cents per 100 lb. of gross weight of the vehicle and the load. Connecticut and Maryland also have systems whereby the fee shoots skyward for the larger buses.

The regulatory authorities may even supervise the purchase of equipment, approve drawings and specifications and compel the improvement of those already in service. It is too early yet to judge what the result of this supervision will be. At present it seems to make for better buses. With wise regulation, and with improved highways that will permit lighter vehicles and more economical operation, the bus, already with such a wonderful development, will have an even more wonderful future as an instrument of transportation.

Experiments with Sherardizing

SHERARDIZING is a method or process of providing steel parts with a rust-protecting coating of zinc without previously melting the latter. Zinc dust is brought in contact with the thoroughly cleaned surface of the part to be coated, under protection from the air, and the parts are then heated to a temperature below the melting point of zinc, when a highly protective coating of zinc is formed on the steel parts. The process was introduced into this country from England about 15 years ago and has come to be widely used for certain purposes.

A paper detailing Experiments with Sherardizing was presented to the American Institution of Mining and Metallurgical Engineers by Leon McCulloch, research engineer of the Westinghouse Electric & Mfg. Co., some time ago. Mr. McCulloch states that the coating imparted to steel parts by the sherardizing process is a brittle alloy of zinc and iron. The zinc particles are covered with oxide and cannot touch the iron, but an extremely small amount of zinc vaporizes and the vapor, reaching the iron, alloys with it.

Other zinc then vaporizes to replace that which has been removed from the atmosphere, and as the coating already formed permits zinc to diffuse through it, the process continues at a decreasing rate. By a certain experiment carried out by Mr. McCulloch it was shown that the growth is at the junction between the iron and the coating; that is, by interrupting the process for a while and then continuing it, it was found that the layer last formed was next to the iron.

As would be expected from the mode of growth, the composition of the sherardized coatings varies from the surface inward. The iron content increases slowly at first and then more rapidly, the minimum possible proportion of iron at the surface being 6 per cent.

The constituents of the sherardized coating are believed to be as follows: The solid solution α , varying in compo-

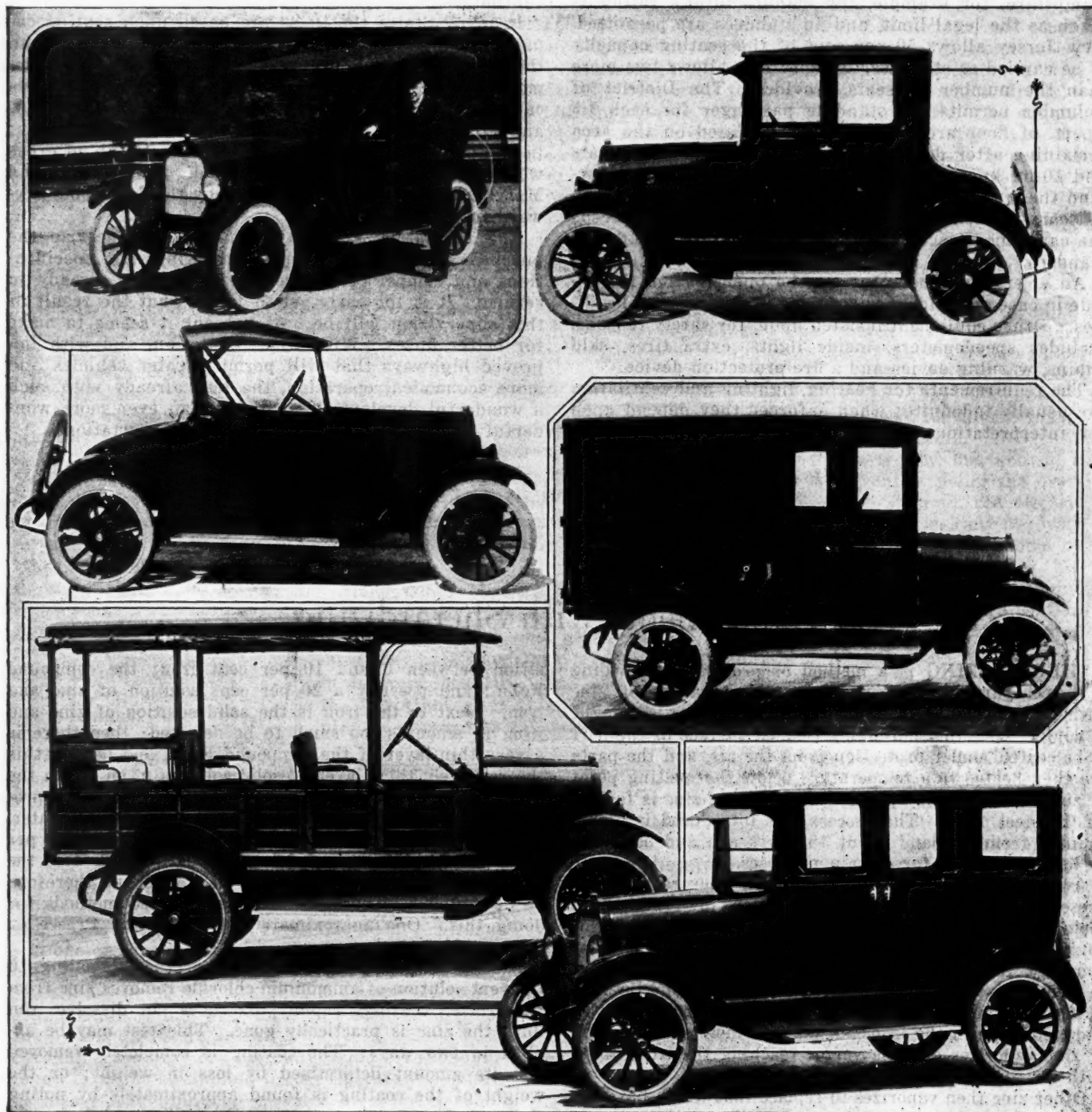
sition between 6 and 10 per cent iron; the compound FeZn_2 ; and possibly a 20 per cent solution of zinc and iron. Next to the iron is the solid solution of zinc and iron, in amounts too small to be detected; then there is a very thin layer of the compound FeZn_2 , and beyond this the relatively thick layer of solid solution α , on which the protection of the iron depends. FeZn_2 can have little protective value, for it readily rusts when placed in water.

Life tests show that a minimum weight of zinc per square inch is necessary for good coatings; to test the value of sherardizing, the weight of zinc should therefore be determined. There are various proposed methods for doing this. One approximate way is by the Preece or copper-sulfate test.

A new method depends on the fact that a boiling 10 per cent solution of ammonium chloride removes zinc from sherardized coatings rapidly, but does not dissolve iron until the zinc is practically gone. This test may be applied in two ways: The coating is completely removed and its amount determined by loss in weight; or the weight of the coating is found approximately by noting the time for iron to appear in the boiling solution. At each 5 min. interval a drop of the solution is removed upon a spot-plate and tested with potassium ferricyanide for the presence of iron. When the blue color appears, the coating is gone, and the time is a measure of the weight of zinc. A good coating should withstand this test for 10 or 15 min.

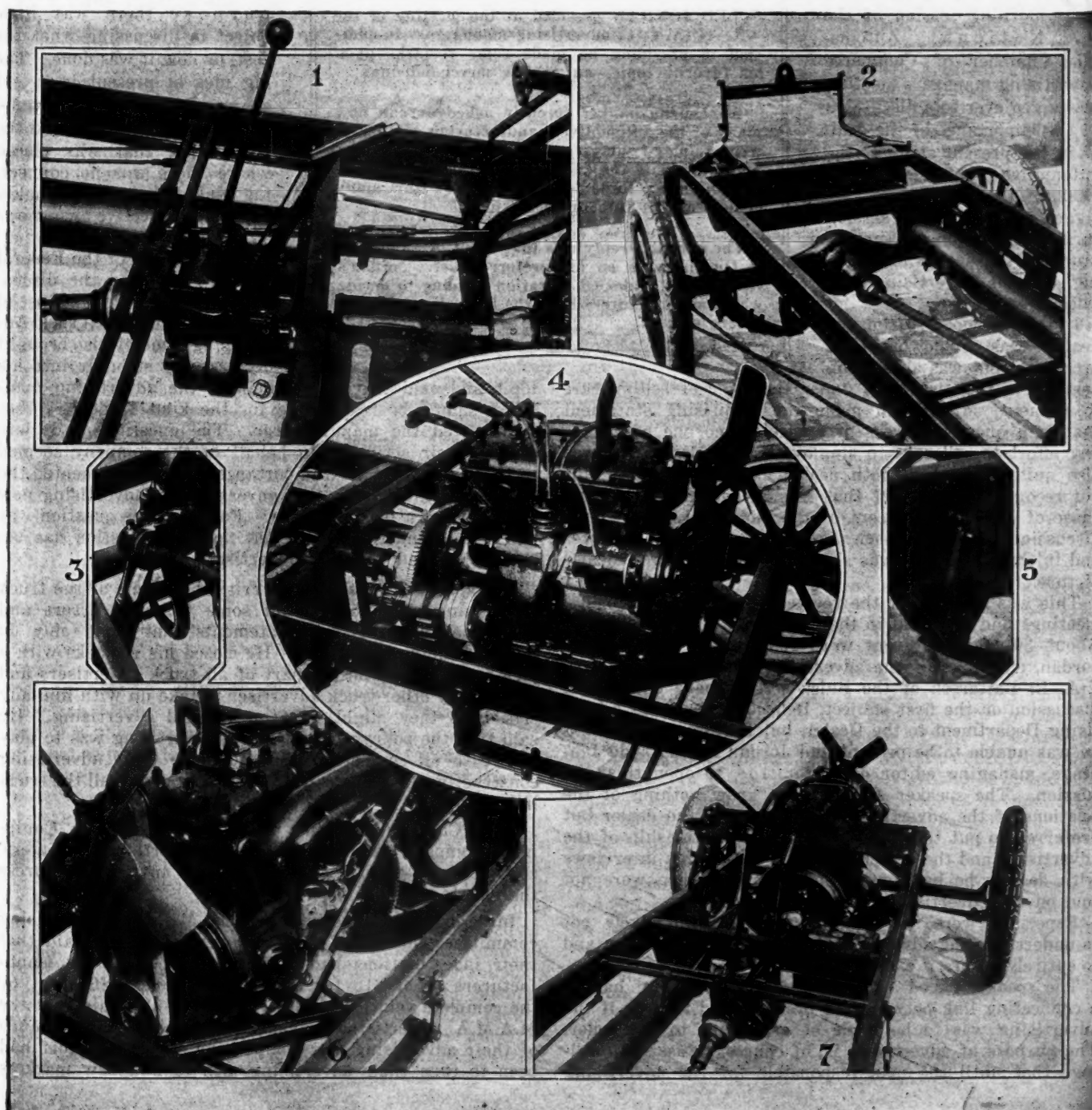
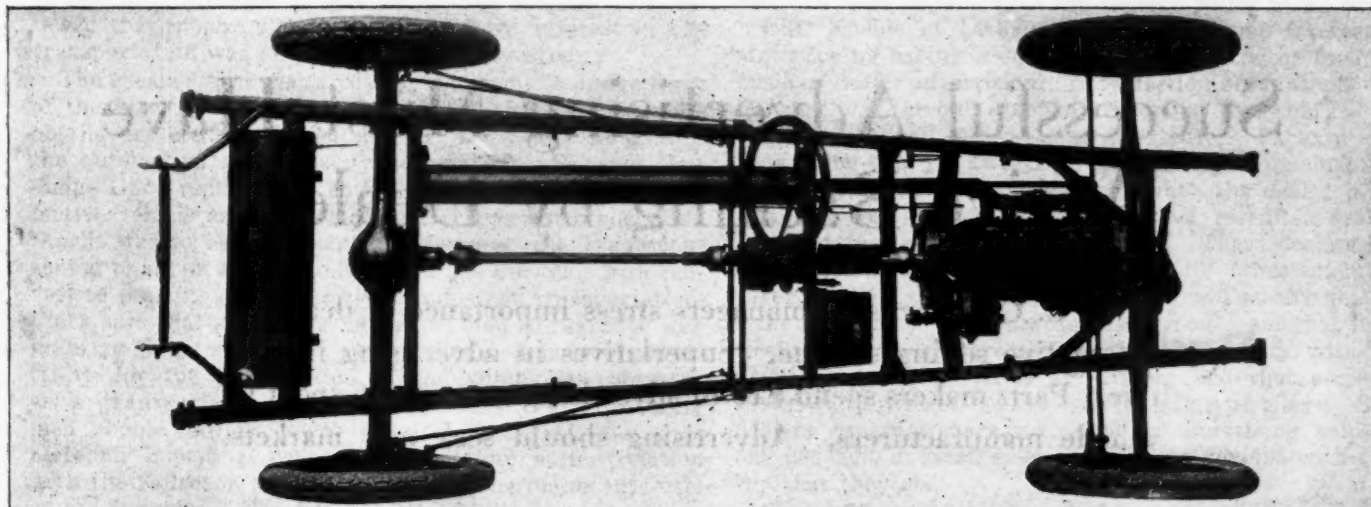
A comparison of short-time rusting tests, such as the salt spray, with tests in actual service, shows that rusting in the short-time tests does not necessarily mean a short life in service. The rapid rusting tests are, however, of value in judging the quality of a coating, when an actual determination of the weight of zinc is made at the same time. These two methods of testing should supplement each other.

Star Body Models and Chassis Parts



The Star body models exhibited for the first time in New York last week and referred to in the news columns of AUTOMOTIVE INDUSTRIES at that time are illustrated above. The first detail pictures of the chassis and its parts are shown on the opposite page.

1—Center portion of chassis showing gearset mounting with its rear end supported from the brake shafts and location of battery. 2—Rear end of chassis showing underslung spring, fuel tank mounting and the new combination tire carrier, license plate bracket and tail lamp which has been added since car was described in AUTOMOTIVE INDUSTRIES for March 16. Note the brake rods which are of thin flat stock with forged ends welded on. 3—The worm and worm wheel steering gear bolted to diagonal frame member. The worm shaft extension is bent forward at right angles to form an integral steering arm. 4—Right side of Continental engine showing mounting of electrical units, fan and pump. The chain is tightened by swinging the generator outward. The pump, mounted near rear of engine, is driven off the rear of the generator-ignition unit by a hose-type flexible connection. 5—Detail of bracket for front end of rear spring. It is stamped from flat stock. 6—Left side of engine showing hot spot manifold and method of mounting. 7—Front end of chassis. 8—Plan view of chassis showing the well constructed frame. The tubular member which also forms the muffler gives the frame an unusual degree of stiffness against torsion.



Successful Advertising Must Have Active Backing by Dealers

N. A. C. C. advertising managers stress importance of dealer in automotive selling scheme. Superlatives in advertising ineffective. Parts makers spend \$10 in advertising to every \$6 spent by vehicle manufacturers. Advertising should seek new markets.

PRACTICALLY the entire morning session of the National Automobile Chamber of Commerce advertising managers meeting was given over to a discussion of the importance of the dealer in the present stage of the automotive vehicle business. Each of the three topics assigned to the morning session turned largely on the importance of the dealer in carrying out an advertising and sales program.

In the afternoon session the dealer was somewhat less prominent but was always appearing in the discussion under the topic of selling cars to women. Miss Bohn made the surprising statement that in a questionnaire sent to dealers no one had made any effort to sell cars to single women. Miss Bohn was also quite critical of both dealer and manufacturer for not recognizing the fact that women determine the purchase of about 75 per cent of the motor cars. The final discussion in the afternoon session was on motion pictures and in this discussion was shown the Paige-Detroit dealer picture.

This was the first of the revived advertising managers' meetings and was held in the University Club at Chicago. About 30 manufacturers were represented. Edward S. Jordan, chairman of the advertising committee, presided.

A. B. Batterson of the Buick was to have opened the discussion on the first subject, Relationship of the Advertising Department to the Dealer, but Batterson wired that he was unable to be present and Jordan asked Clyde Jennings, managing editor of *Motor Age*, to open this discussion. The speaker said that he knew nothing of the relations of the advertising department to the dealer but preferred to put the discussion on the relationship of the advertising and the dealer. He said that in his interviews with dealers he had found that many of them were not sold on the advertising policy of the company.

Especially were the dealers in small towns likely not to understand the advertising tests and its application and to entirely ignore it.

The speaker called attention to the necessity of having a connecting link between the prospect and the car if the advertising was to be made of assistance to the seller. The purpose of advertising is, of course, to assist in selling; that until the man responsible for the advertising

NED JORDAN presided at the meeting of the N. A. C. C. advertising managers. In addition to presiding he made some remarks upon his favorite topic—automobile merchandising.

An Omaha banker recently asked Jordan how many of the automotive manufacturing companies were going to survive. Jordan offered to answer his question if the banker would answer a question in turn. Jordan's question was "How many dealers are on your preferred list?"

The banker's reply was that 6 out of 48 dealers in Omaha were on his preferred list. Jordan's view is that dealer co-operation is going to decide which manufacturers have the largest measure of future success.

had made publicity serve this purpose there was little object in discussing what the cost, or how it was done. The big idea at present is to get an organization that would cash in on advertising and the advertising that was placed where there was no connecting link between the maker and the prospective owner was of little direct value.

L. B. Dudley, of the Federal Motor Truck, led the discussion on the topic of Special Problems in Motor Truck Advertising. Dudley also brought dealers very strongly into his

topic and said that in his opinion the advertising managers should be responsible for the kind of dealers that represented the manufacturer. The question of dealers and of their activities in behalf of the company seemed to Dudley to be of vital importance. He also presented the different point of view that governs truck advertising now from that of a few years ago. Formerly the question was where to spend the money, but now the question has become when and where to advertise.

The speaker was somewhat critical of some of the truck advertising, and pointed out some technical errors and some foolish superlative statements that could only do harm to the manufacturer. He closed his remarks with a plea for fair play on the part of all truck advertisers and invited any other truck advertiser to take up with him any criticisms they might have on Federal advertising. He said that the policy of the Federal advertising was to play fair with all competitors and to make their advertising constructive and for the upbuilding and use of all the truck industry.

Ezra Clark, advertising manager of the Clark Equipment Company and chairman of the advertising managers' committee of the M.A.M.A., was then invited to address the meeting.

In describing the activities of the M.A.M.A. advertising committee, which has now been revived, Clark said that their investigations had indicated that the parts manufacturers spent \$10 for advertising to each \$6 spent by the complete vehicle manufacturer. He also said that the M.A.M.A. advertising manager had found that too much of their advertising was competitive and their effort had been to turn their advertising men to find new markets

rather than attempt to take each other's trade. He believed that much of the promotion of the interest in bus transportation was due to this sort of advertising.

The speaker said that a year ago he went to Judge Gary of the Steel Corporation and asked him to serve as judge of the art contest the subject of which was to picture the automotive vehicle as transportation. He said that Judge Gary replied that he had not thought of the automotive vehicle as transportation and was much surprised that it was to be so presented. However, the Judge consented to act on this committee and has become a firm convert to the automotive vehicle to industrial transportation. Clark said that as long as important men so regarded this industry that there was a great field for industrial advertising for the presentation of the automotive industry as a transportation industry and that the advertising men should always keep in mind that they can promote an industrial conscious legislation, better relation with the railroads and otherwise help the major interests of the industry. The speaker closed with the expression of a hope that in the near future a joint meeting of the advertising managers of the firms connected with the N.A.C.C. and M.A.M.A. could be arranged for the purpose of bringing about a community of interest.

At this point the three talks so far made were thrown open to discussion and practically every man present participated at one time or another. Jordan said that the relations of the advertising managers to the progress of business had been well set out and that he believed that if the advertising manager was not appreciated by any concern that it was his own fault; that the layout of an advertising campaign was the most serious happening of the day that could take place in a motor vehicle factory. That an advertising campaign should mean sales and obtaining of sales meant the success or failure of the company.

An advertising campaign should be planned definitely for a long period and should not at any time be subject to serious alteration of method and that the money should be insured when the campaign was undertaken. He said that the Jordan policy was entirely settled at the factory and that the assistance given to the dealers in advertising did not permit that the dealers were to have any influence at bringing about a change of policy. Instead of that the policy was sold to the dealer.

S. R. Swiss of the Republic Truck reviewed briefly the dealer situation and presented the view that there was entirely too much turnover among dealers and that it was up to the advertising and sales department to bring about a more stable situation and that this could be done only by selling these dealers on the factory policy of advertising and sales and that the dealer situation would not remedy itself until more were planning on establishing dealerships that their sons might come into the business 20 or 40 years hence. His view was that the factory policy should seek to build up a respect and a value for the dealer franchise so that the dealer would see that it was much to his personal advantage and also to his

profit to work in line with the factory policy at all times.

Cliff Knoble of Liberty brought out some interesting statistics by asking a series of questions on the financial basis of dealer advertising. His question brought out that Packard was the only company reporting that charged for catalogs and all other sales literature. Packard had been doing this for two years and has had no complaints. Even during the last few months when the dealer interests had been broadened and they had recruited dealers who had formerly handled other cars. These dealers had not complained about this practice. No other manufacturer charges for catalogs although Cadillac charges for some literature. The question was brought out that practically all manufacturers were going fifty-fifty with the distributor on territorial advertising and that some of the more important dealers had the same privilege. Sub-dealers apparently are restricted to advertising helps to one per cent in retail sales or a certain amount with each car that they sell.

On a series of questions asked about how billing of dealer advertising was arranged it was learned that four companies have the local advertising billed one-half to the distributor and one-half to the factory. Four others have the advertising billed to an agency which in turn bills one-half to the dealer. Two companies reported that they were paying for the billing entirely and then charging the dealer one-half of it on his parts account.

J. E. Baird of the General Motors Truck asked why a factory should assist the dealer in local advertising. W. E. Blodgett of the Auto-car said that his company believed that through this policy they could bring about a greater concentration of advertising in localities favorable to sales. Several

speakers said they believed that this policy was merely a relic of the days when no automotive vehicle was produced in such quantities as to justify really national advertising. Several expressed the opinion that this was not good practice and would eventually be discontinued. Baird announced that his company was practically ready to discontinue this practice.

Jordan was next on the program to discuss The Next Big Selling Punch. He told that recently in Omaha a banker had asked him how many of the manufacturing companies were going to survive. He offered to answer this question if the banker would answer a question for him. This question was how many dealers in Omaha were on the banker's preferred list. The banker's reply was that 6 out of 48 dealers in Omaha were on this list. There are 88 manufacturing firms connected with the N.A.C.C. Jordan said that the answer was so obvious then that he did not repeat the question. Jordan's view is that dealer co-operation is going to decide which of the manufacturers will survive.

The big selling punch of the future will come in the selling of service, according to the speaker. That the manufacturer will find it necessary to build up a dealer organization so that he can give to the owners everywhere, all of the time, and service of transportation that he bought with his car. He put it in this way: "The survival

JUDGE GARY of the U. S. Steel Corporation was asked to serve as judge in an art contest the subject of which was "The Automotive Vehicle as Transportation."

Gary replied that he had not thought of the automobile as transportation and was much surprised that it was to be so presented. He consented to act on the committee, however, and is now a firm believer in the automotive vehicle as a transportation unit.

The incident shows the possibilities for industrial advertising on the part of automotive firms. "Automotive advertising men can promote proper industrial legislation, better relationships between the automotive industry and the railroads, and otherwise further the major interests of the industry which they represent." This is what Ezra W. Clark told the N. A. C. C. advertising managers. The accompanying story relates other interesting details of this meeting.

of the manufacturer depends on the survival of the dealer, which in turn depends on the survival of the owner as an owner of that kind of car. The future of car sales must be replacement." Jordan said that the present buying wave would continue for some little time and then at the fall season would come the wave of used car buying which should carry well into the winter. He suggested to the advertising men that they try to put across this idea.

The open car is a luxury car in the sense that it can be used with comfort only for a part of the year. Even then it is necessary to dodge rains, if the owner would be thoroughly comfortable and realize on his investment. The closed car is an investment because it is an all year car and the owner can get full service from such.

Women and the Automobile Market

Elizabeth Hallam Bohn presented an elaborate analysis of the motor car market from the viewpoint of a woman. She said that while men had created the car and made it a wonderful transportation vehicle the woman's influence had socialized the car and brought it to the point of comfort that marked it to-day. She expressed considerable surprise that car manufacturers had not written more copy directed to women. She said she believed that booklets on motor manners, on proper fitments for a car and on general social use of a car would be greatly appreciated by women.

G. U. Radoye of Haynes led the discussion on the subject of Advertising Used Cars. Radoye presented chiefly the policy put into practice by the Triangle Motors Company of Chicago, last winter. This company rebuilt cars and advertised them as Trianglized cars and made considerable number of sales during that period. Radoye, also, presented a series of advertisements that Haynes Company had prepared for the use of their dealers in the building character for rebuilt cars. He was of the opinion, however, that classified advertising was the best class for sales.

In speaking on this subject Jordan said that he believed the time would come when a new car dealer would have a complete line of cars in his sales room and he would describe them in this way. He would present the current models of cars and say that this car is "now in production at our factory." Then he would come to a car that had been traded in, which had been painted and dolled up and he would say of this car "this car was in production in our factory in 1920." Concerning these cars he would say to the buyers we guarantee all of these cars to be adjusted and in proper condition for use and we guarantee all of them against any difficulty with parts, etc. The guarantee we make to you is the same on the 1920 car as on the current model.

News Items Must Have Importance

The discussion on What Automotive Happenings Are News, was led by Walter A. Birmingham of the *Chicago Evening Post*. Birmingham presented rather a history of how the automotive news department had developed because the automobile was a new thing just as the radio is a new thing to-day. He said that he believed the day for promiscuous printing of publicity items had passed and that the automotive manufacturer who would now obtain publicity must send out news of really important happenings, or of important informative character.

Jordan, who was formerly a newspaper man, told of his own experiences in visiting newspaper offices and how eager he had found the newspaper men to get real articles and to take advantage of any information he could give them about the industry and about the helpful information he could give them at show time to assist them in the write-up of the show. Jordan asked Jennings to comment

on this subject and he said that in his days, as an automobile editor of a daily paper that his time was charged to the business department rather than to the editorial department and that to his personal knowledge the automotive display rates were made to include the amount of space given to publicity, that the automotive manufacturers had never gotten anything free.

The subject of motion pictures in automotive advertising was introduced by K. W. Vance of Paige. Vance told of the discoveries of his company that their was no organized means of distribution. They had paid National News Weekly for showing a few feet of film and had found that the local theater owner had cut out this part of the picture. Then they had tried to deal with the local picture dealers and had found that each one was an individual problem. Later, however, they have organized a system of sending with the film a check payable to the local theater owner when he signed the statement that this picture had been displayed. The dealer, also, served as a check on the question of display. Vance expressed the opinion that perhaps motion picture advertising was better than in the small town papers.

G. U. Radoye of Haynes, told of the experience of his company in seeking to display a rather elaborate film. He said that owing to the un-organized state of the motion picture industry at present he did not believe that a film for presentation to the public was a good investment to-day.

Use of Technical Films

Several speakers told of excellent results of technical films designed to be displayed to technical organizations and among their own dealers. The sentiment seemed to be that the profitable use of films to-day was for educational work.

Vance then had displayed the Paige film, "Four Links of Success." This shows a dealer who had lost all interest and ambition in his business because he believed that cars would not sell. An example of business energy on the part of a factory representative brought him out of the dumps and started him on the road to prosperity. He told of how it had been of much benefit to the Paige dealers in general.

The following factory representatives were present:

Anderson Motor Company, R. G. Wine, Chicago branch mgr.; Apperson Bros. Automobile Co., C. J. Dwyer, adv. rep.; Auto-car Company, W. E. Blodgett, adv. mgr.; Cadillac Motor Car Co., Verne E. Burnett, adv. mgr.; J. I. Case T. M. Co., R. S. Walker, adv. mgr.; Clark Equipment Company, Ezra Clark, adv. mgr.; Daniels Motor Co., H. E. Spoffard, asst. sales mgr.; Dort Motor Car Co., H. S. Daniels, adv. mgr.; Elgin Motor Car Corporation, A. L. Chambers, adv. mgr.; Federal Motor Truck Company, L. B. Dudley, adv. mgr.; The Gardner Motor Co., Inc., W. H. Yeldell, sales and adv. mgr.; General Motors Truck Co., J. E. Baird, adv. mgr.; The Handley Knight Company, D. B. Williams, asst. commercial mgr.; Hupp Motor Corporation, F. Dickinson, adv. and sales mgr.; International Motor Company, H. C. Baily, advertising mgr.; R. B. Anderson, H. K. McCann Co.; GMC Advisory Staff, H. G. Weaver; Kleiber Motor Truck Company, N. B. Burkness, asst. to pres.; Liberty Motor Car Co., Cliff Knoble, adv. mgr.; Lexington Motor Company, Emery Husten, adv. mgr.; Mercer Motors Co., W. A. Smith, sales mgr.; Moon Motor Car Company, N. E. McDarby, adv. mgr.; Nurdyke & Marmon Company, H. H. Brooks, sales mgr.; Olds Motor Works, E. J. Shassberger, adv. mgr.; Packard Motor Car Company, T. E. Cathcart, adv. mgr.; Paige-Detroit Motor Car Co., K. W. Vance, adv. mgr.; The Pierce-Arrow Motor Car Co., W. M. Baldwin, publicity dept.; Reo Motor Car Company, Clarence E. Eldridge, branch mgr.; Republic Motor Truck Co., Inc., S. R. Swiss, adv. mgr.; Service Motor Trucks, Rolfe C. Spinning, adv. mgr.; Studebaker Corp. of America, W. E. Betts, adv. mgr.; Ward Motor Vehicle Company, Edgar Parker, adv. mgr.; The White Company, W. H. Newton, adv. mgr.

Can Factory Rebuilding of Trucks Be Made a Success?

Practical application of this policy by the Autocar Company proves that it can. Trading-in of used trucks limited to own product. Used truck sales placed on sound business basis. Plan may not be applicable under other conditions.

By Philip H. Smith

MANUFACTURERS and dealers both are against the practice of factory reconditioning of motor vehicles and the policy of trading in old trucks. This fact was brought out in the answers to the questionnaire sent to members of the industry by the N. A. C. C. and N. A. D. A. a few months ago.

Factory reconditioning has not been customary practice, hence there have been no difficulties attached to it. Trading in old trucks has been a bugbear for the industry and still is, consequently any time that these two problems have been tackled with even partial success, it awakens interest as to how it was done.

The Autocar Company of Ardmore, Pa., has, for over twelve years, employed the policy of factory rebuilding and has limited trading to its own product. The two problems have thus been handled.

In permitting trading in of its own product a maximum allowance has been set by the factory and the policy of selling almost entirely through its own branches enables this plan to be carried out strictly. If a truck can be put in first-class condition by a slight overhauling, the work is done at the branches and the vehicle is sold as a reconditioned truck. But if it needs more than a slight overhaul it is sent back to the factory, where a separate plant is maintained which does nothing but rebuilding.

On reaching the factory the truck is immediately torn down and each part is carefully inspected. Those parts which by their very nature are non-wearing, and are in good condition, are placed in a used-part stock room to be drawn on later. Other parts which do not pass inspection are scrapped. In rebuilding, no attempt is made to treat the trucks individually; they lose their identity when torn down and the process of rebuilding draws from the used-part stock room and from new stock wherever necessary.

After repainting, a rebuilt truck carries a new truck guarantee. Any new features or change in construction which has appeared since the truck was produced are incorporated in rebuilding so that it is strictly up to date. This is, of course, possible for the Autocar Co. to do, as

they are manufacturers of the parts of their own product.

The deciding factors as to whether a truck shall be rebuilt at the factory or reconditioned at the branch is the mechanical condition of the truck.

The factory charges the branches a flat rate for rebuilding. A branch must sell a rebuilt truck for every truck that it turns in to the factory; in other words, the branches must sell their trade-ins just as if they had never been rebuilt. Rebuilt trucks are sold for very nearly as much as the new product.

Of particular interest is the fact that the number of rebuilt or reconditioned trucks (they must be one or the other for no truck is allowed to be sold "As Is") on hand at any branch is taken into account when selling the branch new trucks. As this would indicate, new and used trucks are not separated in sales, but are considered as one department. At the factory they are segregated. Branches have two departments—sales and service.

There are several vital advantages accruing from factory rebuilding and the policy of only trading in their own product. Some of these are:

1. Avoiding a large used-truck inventory of unknown realizable value.
2. Better used-truck sales through a knowledge of the market for their own product.
3. Reputation of the product not endangered by other makes of used trucks.
4. Ability to turn used trucks into a profit.

Undoubtedly the policy of refusing to trade in trucks of other than their own manufacture has a decided effect in limiting the volume of business which can be secured. It is doubtful whether this policy could be maintained unless there were a large number of owners to sell to.

The greatest benefit bestowed is that used trucks are handled on a sound business basis and are not an unknown quantity. It also shows a recognition of the inter-relation of new and used-truck sales. Instead of this end of the business serving as a continual leak for profits, it is transformed into a source of revenue.

MANUFACTURERS can render material assistance to their selling organizations, whether branches or distributors, by a complete understanding and recognition of the inter-relationship between the new and used product in the field of marketing.

The market for trucks cannot be divided; conditions which affect the market for new trucks likewise affect that for used trucks. This demands that the sale of used trucks proceed steadily lest any hindrance to this flow retard the sale of the new product.

This article shows how one manufacturer has met the problem of the used truck. No division is made in the market and due emphasis is placed on the necessity for considering the used trucks on hand in connection with new truck sales.

Potential Car Sales in South Africa

Estimated at 60,000

Market expanding rapidly. Farmers becoming interested in automotive equipment. One car for every fifty white persons. High dealer discount made necessary by local conditions. Margin between American domestic and South African price is great.

By Perry J. Stevenson*

A MERICAN manufacturers will find an increasing number of prospective buyers of motor vehicles in South Africa for some years to come. Fears were often expressed during 1920, especially when imports were running into large figures, that the market was dangerously near the saturation point and that future sales would only be for replacements. Investigation shows that there is a wide margin between the present number of cars in use and the potential market for the latter.

The Union of South Africa, comprising the Transvaal, Orange Free State, Cape Colony and Natal, imported 24,265 motor vehicles during the last five years, 1917-1921 inclusive. Making allowances for cars re-exported and those held in bond, it appears that the automobile trade has, in the past five years, sold on the average of 4536 passenger cars, 375 chassis and 135 trucks, or a grand total of 5046 motor vehicles per year. Taking these figures and the census of 1920, when there were 25,084 motor vehicles in the Union, it is estimated that there are now approximately 32,000 in operation.

On the basis of white population, South Africa is the largest car market per capita in the world with the exception of the United States, Canada and New Zealand. One in every 50 white persons owns a car in South Africa, as compared to one in 68 in Australia, one in 96 in Great Britain, one in 152 in France, one in 230 in Belgium and one in 1050 in Dutch East Indies.

Local farmers are becoming more and more progressive and are adopting labor saving devices of all kinds. As the cost of labor rises and the supply becomes less abundant, the tendency toward the use of cars and trucks will steadily increase. The Union comprises 81,014 farms averaging 1130 morgen each (a morgen equals 2260 acres).

If the South African ratio of cars on farms could be brought up to only one-third that in the United States, where one-third of the cars are on farms, or $58\frac{1}{3}$ cars to every 100 farms, there would be 16,290 passenger cars

used by farmers alone, not to mention motor trucks.

In addition to the potential buyers on farms there are in the cities some 42,500 possible purchasers of motor vehicles with salaries ranging from £400 to £1,000 per year. A large percentage of the 17,000 motorcycle owners may graduate into the car owning class. In addition, it is estimated that the increase in population, amounting to 11.5 per cent in the period of 1911-1921, will add in the next few years another 3500 to the present number of motorists, especially so, as according to reports from the

High Commissioner for South Africa in London, most of the present immigrants are well supplied with capital. The Asiatic population of 164,000 also includes a number of passenger car owners.

Replacements will be a large factor in estimating the possible sales of the next five years. Allowing the liberal period of eight years as the life of the average car, it is estimated that the replacements will soon number over 4000 per year. At present, while most of the cars are still new, replacements will perhaps only number 2000 to 2500 per year.

Motor Transportation Needed

The use of motor vehicles for city and farm transportation offers by far the greatest possibilities. Although the imports of motor trucks have fallen far behind those of passenger cars, due to the lack of intelligent figuring on costs and unsatisfactory roads, motor transportation will in time come to take a more important position.

Lack of adequate transport facilities at reasonable rates has probably been the chief cause for the slow economic development of the Union. It is reported that at present the South African Railways are giving considerable thought to the problem of using motor transportation as feeders to the main traffic in place of expensive branch lines. In the event that private initiative does not get there first, it is highly probable that the railroads will do so.

It has been suggested that the South African Motor Traders' Association should appoint a committee to study

*U. S. Trade Commissioner, Johannesburg. Printed through the co-operation of Automotive Division, Bureau of Foreign and Domestic Commerce.

the problem of how to increase motor haulage and should report its findings to the Association for the benefit of all its members. The scientific study of this problem and the gathering of accurate data on the comparative costs of oxen, rail and motor transport, would be a valuable contribution which the Association could make.

At the present time there is too great a margin between car prices in South Africa and those in effect in the United States. The South African price is, in some cases, over 200 per cent, and even as high as 320 per cent above the American equivalent. At the present rate of exchange, American cars might reasonably be sold in South Africa at 100 per cent above the sterling equivalent of the retail price in the United States.

A car that sells in the United States for about £200,

at the present rate of exchange can be landed at Johannesburg for £300 after paying duty and railway charges. The dealer should sell for £400 to make a fair profit.

A profit of 33⅓ per cent may seem high to American manufacturers, but local conditions demand it to keep a dealer from becoming insolvent. The capital investment is higher, due to high building costs, overhead and a higher interest rate in an undeveloped country. The great distance from the source of supplies necessitates larger stocks, and repair work is all done on a credit basis according to British custom. An important factor is the small turnover where business is so highly competitive.

Stocks of cars on hand have been radically reduced, business is once again satisfactory, and prospects are that imports from the United States will be normal in 1922.

Research Develops Electrical Equipment to Meet Variable Operating Conditions

By A. M. DUDLEY*

IT is fundamental that any passenger car or truck, to render the maximum service, must be capable of meeting a wide range of operating conditions. In addition to the actual working schedule of hours' time, load carried and miles covered, questions of climate, temperature, topography, road conditions and personal equation of drivers introduce an almost limitless number of variables.

The electrical equipment used for cranking the engine, igniting the charge and for lighting and signalling purposes shares with the complete job the difficulties in meeting this wide range of conditions. A third brush generator set for an output which covers a wide average of applications may overcharge in Texas and undercharge in Minnesota under what seem to be identical conditions.

The study of these divergent results and the experimental work with new combinations and new principles forms the basis of extensive research work which is being continually carried on by leading manufacturers of electrical equipment for automobiles.

Some of these problems of general interest are:

1. In the attempt to produce a universally durable and noiseless timing gear for motor car engines:

a. The general timing gear problem. This covers the manufacture in quantity of a quiet, durable operating gear to a fine degree of accuracy and also holding the crank case or gear supports to a degree of accuracy which will prevent the necessity for selecting and matching up sets or trains of gears for a particular engine. It includes also a consideration of the entire engine design with a view to eliminating hollow or sounding board construction of parts adjacent to timing gears which will magnify the natural noise or carry it to other parts of the chassis where it is more plainly noticed. These results to be secured at minimum cost.

b. The mechanical requirements of such a gear involve: Machining accuracy required in gears themselves; variations caused by inaccuracies of machining in engine parts; wearing qualities of gear material; sound deadening qualities of gear material; study of vibrations set up by engine operation; study of natural period of vibration in the gear itself; machining qualities of gear material such as taking accurate finish, reasonable wear on cutting tool, absence of brittleness tending to chipping; coefficient of expansion under heat of the gear material, must compensate for expansion of gear center distances on the engine so that gears run quietly, both cold and hot.

2. In the study of third brush current regulation of generators and their action coupled with storage batteries:

a. Effect of brush contact on commutator of main and third brushes as affecting current regulation.

b. Various elements entering into the shape of the current—R. P. M. regulation curve and the effect upon batteries of various shapes of this curve.

c. Effect of commutator expansion on brush contact and current regulation.

d. Instantaneous shape of magnetic field at different outputs and speeds, as shown by oscillograms. The effect of this shape upon performance and noise, and how it may be changed.

e. Relative desirability of various methods of eliminating magnetic noise.

f. Analysis of separate sources of losses in generator and effect upon heating and performance of redistributing these losses.

g. Effect upon heating and regulation of short circuited currents under the main and third brushes.

h. Requirements of different passenger car and truck applications as affected by climate and other conditions outside the vehicle design.

3. In study of special applications of battery ignition:

a. Effect on combustion of using more than one spark plug.

b. Degree of synchronizing necessary with more than one spark studied by oscillograms and indicator cards at different speeds and loads.

c. Effect of variation of battery potential on ignition performance.

d. Effect of battery performance on ignition when using batteries of different capacities under same car conditions.

e. What is a "fat" spark and how best produced.

f. New uses for oscillograph and indicator in studying comparative ignition performances.

4. In the study of electro static condensers:

a. Relative advantages of different forms of condensers, e. g. stacked, rolled, molded, etc.

b. Material studies, paper, wax, mica, foils, etc.

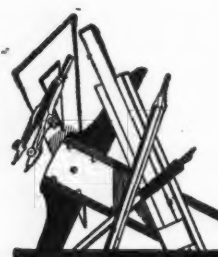
c. Process studies, such as impregnation, molding, winding, soldering, connecting.

d. "Shape" studies—cylindrical, rectangular, "Kidney," etc.

e. Dielectric studies—materials, creepage distances, distribution of strain, etc.

The solution of problems as indicated above involves not alone the elements directly concerned, but invention of new tools or new applications of old tools and methods.

*Mgr., Auto. Eng'ing Dept., Westinghouse Electric & Mfg. Co.



The FORUM



Why Navy Recommends Completion of ZR-1

FROM a design point of view ZR-1 does not resemble ZR-2, and the basis of design of ZR-1 has practically no relation to ZR-2. The basis of design of ZR-1 is taken from information obtained from German rigid airships thoroughly tested and successfully flown.

The National Advisory Committee for Aeronautics has appointed a special committee of engineers to make a complete study of the plans and specifications for the ZR-1. This action has been taken upon the request of the Chief of Bureau of Aeronautics and was done with the idea of getting a final check from the best engineering talent available in this country. This action was also taken as an answer to the criticism in the British press when the ZR-2 disaster was being discussed.

So far as the design and construction of the ZR-1 are concerned, the best information available has been obtained and due consideration has been given to the experience in Germany, Great Britain, France and Italy.

The British have temporarily ceased lighter-than-air construction, but negotiations are still under way to turn over all their equipment to a very powerful financial combination made up of Vickers & Co., Ltd., and the Shell Oil Company. If these negotiations go through, or if the major part of these negotiations are consummated, there is no doubt but that the lighter-than-air game in Great Britain will not only not be abandoned but will be developed as rapidly as practicable.

The statement of paragraph 4 with regard to German opinion is certainly based on misinformation. Commercial enterprises now being promoted for two overseas passenger services are based exclusively on rigid airships of greater sizes than were ever attempted during the war. This is on the ground that commercially only the very large ships are economical as carriers. As a matter of fact, the Germans possess at the present time designs of airships very much larger than the ZR-1. ZR-1 has a capacity of 2,000,000 cubic feet, while the Zeppelins L-70, 71, 72, L-57 and L-59 had a capacity of 2,420,000 and ZR-2 had a capacity of 2,750,000 cubic feet. It is definitely known that designs of airships of 4,000,000 cubic feet exist in Great Britain and in Germany. It is also pretty definitely known that designs of airships up to 10,000,000 cubic feet are in existence.

So far as the operations of lighter-than-air craft are concerned, it is believed that this matter will be satisfactorily solved by the time the ZR-1 is completed. Certain experience has already been gained by handling smaller ships. Some of our personnel have already received instructions in operating large rigids, and addi-

tional instructions will have been received by our personnel by the time that ZR-1 is finished. Arrangements are being made for the instruction of the American crew by some of the most experienced and expert rigid airship people in Europe.

The bureau thoroughly appreciates the fact that it is essential to insure safety of operation in handling rigid airships, but it is strongly of the opinion that the construction of ZR-1 should be proceeded with in order that proper development of the lighter-than-air art may go hand in hand with the development of the heavier-than-air art. It is the earnest desire of the bureau to take advantage of experience gained by other nations and by the United States, and each step in the development,

design and construction of ZR-1 has been given careful and mature consideration in order that errors made heretofore may be avoided in the case of ZR-1.

Pioneering in any art or science involves the expenditure of brains and energy and a certain amount of risk, but the bureau is firmly of the opinion that the construction of ZR-1 should

be continued and expedited in every practicable way. The fleet requires a long range scout and the rigid airship is the only answer.

The Bureau of Aeronautics, Navy Department, has requested that we publish the accompanying comments concerning our editorial in the issue of May 11, 1922, entitled "Can Airship Builders Walk Before They Creep?" We, of course, desire to give both sides of the argument and are therefore pleased to record the point of view taken by the Navy on this important subject.—Editor.

Grease vs. Oil as a Lubricant

Editor, AUTOMOTIVE INDUSTRIES:

With your permission I would like to discuss in a brief way Mr. J. Henly Frier, Jr.'s Forum letter on the relative merits of grease and oil as a chassis lubricant. This letter appeared in AUTOMOTIVE INDUSTRIES for Feb. 23, 1922.

The problem of chassis lubrication is a tremendously complicated one, involving all sorts of considerations of design, maintenance, manufacturing expense, owner's preference, and a hundred and one other things not apparent to the casual observer.

Chassis lubrication as now practiced is far from being perfectly satisfactory, regardless of whether either grease or oil is used as the lubricant. The average chassis as it is now built demands both oil and grease, if it is to approach a condition of proper lubrication. In other words, there are places on the chassis where oil is the proper lubricant, and others where grease is the proper lubricant.

If this is true, how idle it is to make the broad statement that grease is the best chassis lubricant, as is done in paragraph six of the article in question.

It is necessary to get down to details and consider each bearing or group of bearings by itself before any conclusion can be reached as to the proper lubricant, and then

a decision can only be reached on the particular bearing or group of bearings considered, and not on all the bearings in the chassis.

A good part of the discussion I have seen centers around the steering spindles, tie rod bolts and shackle bolts, probably because they are the worst bearings to lubricate properly. For the purposes of this article I will confine myself to consideration of this group of bearings.

This group of bearings has one peculiarity which has apparently completely escaped the attention of Mr. Frier, i. e. none of the bolts or pins ever make a complete revolution in their bearing.

I submit that it is a practical impossibility to completely coat the inside of a bearing of this character with any semi-solid lubricant introduced through a hole in the side of the bolt, unless at some time the bolt or pin makes a complete revolution in its bearing, remembering that the ends of the bearing are open for the escape of the lubricant.

The fact that the lubricant may be introduced at the point of load, as in the case of a shackle bolt, does not necessarily mean that all of the wearing surface is covered. The actual surface covered is likely to be merely a spot directly over the oil hole in the side of the bolt, or if the pressure in the gun is high enough, the surface covered is a streak reaching to the nearest point of relief. There is no reason to expect the grease to seek out all the wearing surface; in fact, it is quite apparent that nothing of the kind will happen.

The comparatively slight oscillation of the bolt in its bearing will, of course, help in some degree to distribute the grease. That anything but a complete job is done is amply testified to by the collection of worn grease bolts that can be found in any repair shop.

Suppose we admit, for the sake of argument, that each time a shackle bolt is lubricated by grease under pressure, that the wearing surface is completely covered, it certainly does not follow that the opposite or unloaded side of the bolt is completely covered. It must be remembered that the bearing is open at both ends to permit free escape of lubricant, and that the bolt oscillates through only a few degrees. These conditions operate to make the chances of complete distribution of lubricant on the slack or unloaded side of the bolt very remote.

If the unloaded side of the bolt is not covered, or only partially covered with lubricant, it is free to rust and collect road grit which eventually works up to the bearing surface and acts as an abrasive.

TURNING to the steering spindles, it is interesting to note that a good many manufacturers use some kind of an oil cup in this place, even though they may use grease on their shackle bolts. If grease is a perfect lubricant, why do they go to the trouble and expense of providing for the use of two kinds of lubricant on their chassis? I believe they have found out by experience that it is a practical impossibility to properly lubricate the long steering spindle bolt with grease, especially in cold weather. The stiff steering of a car with dry spindle bolts is very disagreeable, if not positively dangerous, and a way had to be found to keep the spindles lubricated.

Mr. Frier quotes from Mr. John Rome Battle's book on Industrial Oil Engineering. I find nothing to indicate that Mr. Battle is a recognized authority on lubrication in general, or on chassis lubrication in particular. I believe his book antedates the active period of chassis lubrication by several years. In fact, the very title of the book would indicate that Mr. Battle did not have chassis lubrication in mind when he wrote it.

I cannot see how this quotation has any particular bearing on the subject of modern chassis lubrication.

Whether Mr. Battle's seemingly rather extraordinary reasoning on the subject of grease lubrication agrees with that of the best modern authorities on the subject or not, I think it is almost certain that Mr. Battle had no idea of extending his theory to the oscillating bearings of an automobile chassis. It seems more likely he had in mind the heavy, slow, revolving journals of certain industrial machinery. If Mr. Battle had contended with the problem of forcing grease into one side of the bearing he had in mind, knowing that the shaft would never make a complete revolution, I am of the opinion that his choice of a lubricant would have been different. He would, I imagine, have been forced to use oil, probably not an excessively heavy oil either.

IF the exact service expected of a lubricant is left out, and all that went before or after is to be omitted, it would seem easy to select quotations from a number of authors to bear out nearly any statement one chose to make.

In the absence of the specific service which is expected from the lubricant, only the broadest treatment of the subject can be helpful, and any quotations should be chosen accordingly.

Mr. Charles E. Carpenter, president of the E. F. Houghton Co. and an authority recognized by all lubrication engineers, says: "That lubricant is the most economical which possesses the greatest fluidity consistent with the use to which it is to be put." This quotation means something; it applies to all lubricating problems, chassis lubrication among the rest. He also says: "The great difficulty with grease is when the bearing is subjected to shock, the grease does not cushion like an oil; the oil will resist, slide away gradually and then dart back to the point from which it has been squeezed."

This exactly describes the conditions present in the automobile shackle and shows why an oil must render better service in bearings of this character than grease can.

Mr. Frier mentions the dirty appearance of a chassis lubricated with oil. I think he meant over-lubricated, as it is entirely possible to so lubricate a chassis with oil that no objectionable amount of oil will appear outside the bearing, even with the common designs of shackles, in most cases not particularly designed for retaining oil.

It is, of course, a matter of personal choice as to whether one prefers to see a certain amount of oil outside the shackle and be sure of good lubrication of the bearing, or to see a certain amount of grease outside the shackle and not be sure of even partial lubrication of the bearing.

Mr. Frier speaks of the impossibility of dirt entering the bearing, if the grease is introduced through a fitting having a ball valve closure. I submit that it is extremely probable that dirt enters every time a bearing is lubricated by grease under pressure through such a fitting.

It is a practical commercial impossibility to construct a fitting of this description without its having a shallow groove around the ball where it projects through the end of the fitting. This groove remains full of road dirt, no matter how much wiping off is done, and must pass into the bearing with the grease. As far as the cap sometimes supplied with such fittings is concerned, no unattached cap stays around the chassis long enough to help much.

Mr. Frier also speaks of the pleasing appearance of these fittings. This is, of course, another matter of taste. I consider that they look well enough, if you can see them; they are so small and are generally so covered with mud or dust as not to be very conspicuous. Whatever one's taste may be on this point has no bearing on the choice of a chassis lubricant.

C. A. BACON,
Chief Engineer, Bowen Products Corp.

Employers Must Originate Improvements in Labor Situation

Unions too young to extend platform beyond immediate demands.

British co-operative societies and their possible counterpart here.

The character, habits and interests of labor must be studied.

By Harry Tipper

SOMETIME ago, in AUTOMOTIVE INDUSTRIES, reference was made to the work which has been done in Great Britain in the experiment of guild operations which, in effect, amount to copartnership among various organizations of workmen for the direct operation of business with their own capital and for themselves. These experiments are being continued and extended in Great Britain. Of course, the ground was prepared by the operations of the co-operative societies which were started as trading societies only, but which developed into manufacturing, shipping, warehousing, and other activities.

Co-operative societies, before the war, were doing a business of approximately \$600,000,000 a year, and they had been built up entirely by the workers with their own capital and their own management. The operations of these co-operative societies did not differ very materially from the operations of the ordinary business except that a portion of the profits has turned over to the workers as a dividend on wages, the rest of the profits being divided between a dividend on purchases and a dividend upon the capital invested.

Another difference between these and other business institutions lies in the fact that the stock in these co-operative societies is owned by the customers and there is an active interest from the customer's standpoint in all the considerations of the co-operative society work. In other respects they are very much like the ordinary business. The volume of trade handled in proportion to the number of people employed is not startling and does not reflect any great increase in the efficiency of the work. The percentage of profit is not low—in fact, it averages probably somewhat higher than the percentage of other business concerns in the same field. Neither does the share reserved for the dividend on wages stand out as notably larger than the share offered in some of the profit sharing schemes adopted by other business concerns.

Probably the most advanced of all these producing associations of workers is the building guild in respect to which we published some few particulars some time ago. The London Times states that the capital invested in these

producing associations is something over a million pounds and is turned over about three or four times a year with a net profit of 25 per cent. The growth of these organizations as they have flourished in Great Britain has not made any change in the general method of doing business. Their operations are similar to those of any other industrial concern. Their methods of payment are similar, and their reserve of profit is not less. The important feature lies in the ability shown by a homogeneous people, through the machinery of their associations, to engage in business co-operatively, to continue over a period of years, and to progress at least in as large a proportion as other concerns.

Co-operative societies have been started from time to time in this country. They have not attempted anything more than a trading control and they have not been either large or very successful.

The above illustrates very definitely the difference between the position and the interest of the workers in Great Britain and those in a similar position in this country. The workers in Great Britain have been accustomed to working in the same place and living in the same place for several generations. By position and long development of association, their machinery of organization is very complete and the individual takes a keen interest in all matters developed through the association. This long experience in association work has also

UNION power in the United States is not strong enough to demand the consideration that the labor party receives in Great Britain. Any necessary changes in the character of industrial organization for the purpose of limiting or eliminating the difficulties and interruptions must come out of the manufacturer's larger consideration of the matter and his willingness to experiment for the purpose of improvement.

The machinery of the union organization is sufficiently weak and the number of unorganized workers sufficiently large to enable the manufacturer to bring into play the ideas of an organized industrial community, organized for the purpose of, and around the object of, the common production of those people who are engaged in that particular concern.

placed the emphasis upon the practical side of association development.

Some business men and publicists in Great Britain are inclined to see in these co-operative associations a way out of the continual stoppages, disagreements and difficulties concerning the ordinary business institution in that country. The complexities of the labor union divisions and the difficulties of maintaining a reasonable peace with all the different unions at any one time lead in that country to a very serious discussion of the possibilities of co-operative producing associations similar to the guilds already formed.

These discussions have laid a great deal of emphasis upon the absence of strikes in the co-operative associations

of business, the steadiness of the employment and the relief from the other hindrances continually disturbing the productive work of the ordinary business institutions.

In this country we have no homogeneous population of workers. The working population is composed of many races with different conditions and associations and with different habits of approach to any question. There is no common political viewpoint, and the average worker does not take much interest in the collective actions of the associations of which he may be a member. Any co-operative associations for production which might start in this country would be unlikely to have any success in the immediate future because of these differences in the conditions. However, the success of the guilds on the other side is likely to have some effect upon the thinking of the labor leaders in this country and the development of their active platforms. Something of this sort is indicated by the continuance of the propaganda by railroad unions in regard to the operation of railroads, and the more recent statements of the leaders of the mine workers in regard to the operations of the coal mines.

Aside from this reflex upon the platforms and ideas of the labor leaders in this country, the co-operative movements in Great Britain carry no especial significance in themselves. They are interesting from the indications they give as to the ideas of the workers when they are engaged in business for themselves as collective organizations. It is evident from an examination of their operations that workers in Great Britain are interested. . . .

1. In continuance of employment
2. In the maintenance of the union methods, and
3. In a voice in the affairs of the producing unit.

These demands are not excessive and they have been admitted by the organization of individual concerns in Great Britain and in the United States. In the United States, the different conditions make it necessary for the manufacturer to introduce many changes in the business organization, and it is not likely that the unions will be sufficiently powerful or the interest of the individual workers sufficiently keen to extend the platform of the union leaders much beyond the actual requirements in hand. It is obvious that union power is not yet sufficient in the United States to demand the consideration the labor party receives in Great Britain, and the present tendency makes it quite as obvious that any necessary changes in the character of industrial organization for the purpose of limiting or eliminating the difficulties and interruptions must come out of the manufacturer's larger consideration of the matter and his willingness to experiment for the purpose of improvement.

THE interest occasioned by the building trade guilds and other newly formed producing associations in Great Britain is largely due to the fact that trade union machinery has been sufficiently complete for so long that neither the manufacturer nor the laborer can consider the industrial organization without the presence of these elements.

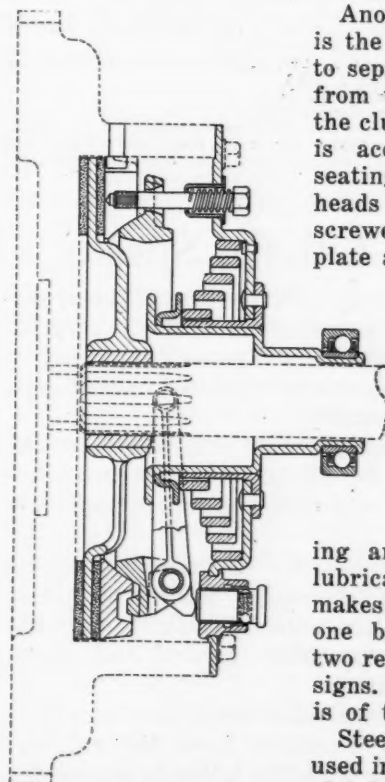
In the United States, on the other hand, the machinery of the union organization is sufficiently weak and the number of unorganized workers sufficiently large to enable the manufacturer to bring into play the ideas of an organized industrial community, organized for the purposes of, and around the object of, the common production of those people who are engaged in that particular concern.

A New Self-Aligning Single-Plate Clutch

A NEW single-plate clutch designed primarily with a view to securing a uniform pressure over the faces of the driven member is being placed on the market by Baker Brothers.

The design is attributed to Charles B. Rose, who states that, in his experience with some other single-plate clutches, he has found a lack of uniform pressure resulting in slipping and consequent rapid wear, and that this fault develops frequently due to a lack of sufficient accuracy in the machining of the parts which bear against the friction members or to uneven adjustment of the parts through which the thrust of the engaging springs is transmitted to the friction disks. Perfect alignment of driving and driven members is rendered more difficult due to the fact that the flywheel face, which is usually one of the bearing surfaces, and the face of other members, which should be precisely parallel to it, are frequently made by different manufacturers, so that proper alignment is not always secured.

In the new clutch, as shown in the accompanying cut, the pressure plate has a part-spherical surface against which bears a second member with a similar or mating surface, forming, in effect, a ball and socket joint, the purpose of which is to take care of any lack of alignment and thus give a uniform bearing on the friction surfaces. The male member of the ball joint carries multiplying levers through which the pressure of the single volute spring is transmitted. The outer end of these drop-forged levers bear against self-locking adjusting screws which, because of the ball joint, are said not to require close adjustment.



Sectional view of Baker single-plate clutch

Another feature of interest is the special means provided to separate the pressure plate from the friction disks when the clutch is disengaged. This is accomplished by springs seating in the cups under the heads of the bolts which are screwed into the pressure plate and project through the cover plate.

It is worthy of note that the disengaging sleeve has no bearing whatever upon the clutch shaft, with which it does not come in contact. This construction avoids the bushing and consequent need for lubrication at this point and makes it necessary to use but one ball bearing as against two required in some other designs. The throw-out bearing is of the radial thrust type.

Steel stampings are largely used in the construction of the clutch, which is carefully balanced and assembled.



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A Railroad Official Speaks

THE attitude of railway officials toward co-operation with highway transport is widely divergent, ranging all the way from direct opposition to active support. No attitude seems particularly characteristic of any part of the country.

Truck manufacturers will be interested in the statements of one railroad official who may be considered as one of those who favor co-operation. He believes that:

"The justifiable business for the motor truck is limited to a distance of fifty miles from a terminus. Longer runs in competition with the railroads are not profitable if costs are accurately figured and allowance made for depreciation.

The attitude of truck manufacturers and operators is one of taking away business from the railroad rather than co-operating with the latter to secure the business which is rightfully theirs.

Motor trucks cannot make long hauls of valuable merchandise at a lower cost than the railroads if they

carry the requisite insurance.

In large cities much of the trucking is done by former teamsters who do not understand the necessity for depreciation allowance."

This official thinks that truck manufacturers should foster a spirit of sound business in making sales and should disseminate the principles of sound operating cost keeping.

In his opinion, economic laws will eventually work around to bring a more profitable arrangement between railroads and highway transport, but meanwhile manufacturers can do much to mitigate some of the existing evils.

S. A. E. Meeting Program

IN making up the program for the semi-annual meetings of the S. A. E., the Meetings Committee seems to have two objects in view, namely (1), to present something of special interest to all of the different branches of the industry, and (2) to cover particularly any recent trends and developments. Ever since the war, aircraft has occupied a prominent place in the deliberations of the society, and the program of the present meeting is no exception, containing as it does three papers on aeronautic subjects. In spite of the handicaps under which the aircraft industry is laboring, there is still much research work going on and much constructive thinking being done in this field, much of it in the Engineering Division of the Air Service. Some of the best research talent of the country is connected with aircraft development, and there are so many aspects to the problem of aerial transportation that material on this general subject seems never to be lacking.

There is a passenger car session and a commercial vehicle (motorbus) session, so that engineers in both of the great branches of motor vehicle engineering stand a good chance of learning something of practical value to them.

The two sessions which mark relatively new developments in the industry are the Motorbus Session and the Research Session. Two years ago the society began to pay attention to the motorbus at its general meetings, but some of the earlier papers dealt rather with the commercial and organization phases of the motorbus industry than with its technical aspects. Recently there has been a great extension of the use of motorbuses, especially in country and suburban districts, and many firms in the truck branch of the industry have begun to interest themselves in it, hence it is quite timely that the engineering requirements in motorbuses should have some light thrown upon them at an S. A. E. meeting.

Since the society has actively undertaken to promote research work and has made a sizable appropriation for the purpose, the membership naturally wants to know what has been accomplished so far and what are the plans for the future. A report of this phase of the society's activities is being made by Dr. Dickinson, who is in charge of this work. There are also being presented at this session two papers by members of the staff of the Bureau of Standards, and the titles of these papers as well as the outline

of Dr. Dickinson's report emphasize the fact that a very large proportion of the automotive research now under way has to do with the properties of engine fuels and methods of their use.

For the final session, devoted to fuels and engines, some of the best papers of the meeting are scheduled. The subjects of these papers, moreover, are of the most general interest of any presented at the meeting.

On the whole the program is one of diversified interests, and that high expectations are attached to it by the membership is shown by the number to which the registrations had attained just before the opening of the meeting, which, considering conditions in the industry during the past year and the distance to the meeting place from most of the large centers of the industry, is larger than might have been expected.

Experience in Bus Design and Operation

THOSE who are engaged in or contemplate entering the field of bus manufacture will do well to heed the sound advice given in the paper by G. A. Green, of the Fifth Avenue Coach Co., which appears on another page of this issue. Some engineers will not agree in all of the conclusions arrived at, but concerning fundamentals there will be little disagreement. Aside from the London General Omnibus Co., in whose service Green secured his early experience, and the company with which he is now connected, there are but few concerns of prominence which build as well as operate their own buses. The consequent close co-operation between user and producer has therefore seldom been attained elsewhere, and it is partly for this reason that the article in question is worthy of such close study.

A wholly suitable bus chassis must be designed for the purpose of carrying passengers safely and comfortably. The problem is not satisfactorily solved by simply applying a body with seats to existing chassis designed primarily for use as trucks, and those who follow this practice inevitably do so at the risk of securing dissatisfied customers. No sound business can be built upon such a basis.

Aside from the matter of safety, which should be the prime consideration in the design of any vehicle, that of dependability, or freedom from trouble and unnecessary delays for adjustments and repairs, is perhaps of greatest importance; but this characteristic is of small consequence if the vehicle remains so uncomfortable to ride in that possible patrons avoid rather than seek its use. In this connection, the comfort of the driver must not be forgotten, for aside from any humane reasons pertaining to the driver himself, the safety of the passengers is involved. A fatigued driver, as Green points out, is much more likely to make mistakes which result in accidents than one whose energies are conserved by providing a comfortable seat, easily operated controls and a responsive vehicle.

Ability to accelerate and decelerate smoothly as well as quickly are qualities which now depend too much in many cases upon the skill of the operator.

There is room for considerable improvement in brake design, while the characteristics of even the best of conventional internal combustion engines are far from ideal. The steam engine, because of its high torque and smooth, steady pulling characteristics, and the fact that its use makes it possible to eliminate the conventional clutch and gearset, has still great promise for application in bus as well as in other vehicular work, especially where frequent starts and stops are involved. Highly successful steam buses have been operated for many years in London and their possible development here in the near future should not be overlooked.

Incomes and Automobiles

THE recent publication of 1921 income tax returns in the daily press may bring out another crop of "saturation point" discussions in connection with automobiles and trucks. 'Twas ever thus.

We hasten to reiterate our thoughts on the subject, in the hope that priority of expressions may bring added emphasis.

The total number of automobiles operated in the United States is related to the income tax returns only in a very indirect way. Automobiles and trucks are primarily a form of transportation. They will continue to be sold in increasing quantities until the transportation-needs of the American people have been entirely met. Only when this point has been reached, will the car market become entirely a replacement market.

A good proportion of the passenger cars operated in this country to-day are used solely for business or utility purposes. They are not dependent upon the income tax returns of any individual. They are, in fact, responsible for producing income. Take them away and the income tax returns would fall.

In the class are all taxicabs, jitneys, omnibuses and other passenger cars for hire. Cars operated by salesmen, by industrial plants for the efficient transportation of executives, doctors' cars and others are used entirely for utility purposes, and consequently become a factor in providing income rather than in expending income.

Nearly every one of the 10,000,000 cars in the United States is used partly for business or utility purposes. Every car, therefore, is to some extent a provider of income—or a reducer of expense in time or money—which is much the same thing.

These facts appear clearly to the careful student of automobile production and operation. They show clearly the utter fallacy of discussing a mythical saturation point on the basis of income tax returns.

Automobile sales and operation depend upon many factors, each of which exerts a certain proportionate influence. No accurate estimate can be made of future automotive development by reasoning simply about one of these factors. All of them must be considered and correlated. Income tax returns probably do not affect automobile sales any more than automobile sales affect income tax returns. Saturation point discussions on this basis, therefore, are something like arguing in a circle.

Truck and Tractor Business Mounting

Passenger Car Plants Continue at
Full Speed—Output May
Exceed 200,000

By JAMES DALTON

NEW YORK, June 20—All passenger car plants still are operating at full speed and truck factories are steadily increasing their output. Many companies, especially those which might be placed in the middle class in volume of production, claim to have on hand sufficient orders to keep them going at the present pace from one to three months. Makers of several of the more popular lines are far behind on deliveries.

Reports from the South and from the centers of the great agricultural districts, are all to the effect that much automotive equipment will be purchased by planters and farmers as soon as the harvests are well under way. The South promises to be a particularly good market in the fall. Sales of tractors and other agricultural machinery also are steadily mounting. The leading interest in the low priced tractor field is unable to keep pace with orders.

The Northwest may be taken as typical of these sections. Sales of motor vehicles in May broke all records, but with the beginning of June there was something of a recession in demand. This is expected to continue until the harvests. There is every reason to believe that it then will revert to the level of May.

Output Not Likely to Equal May

Indications are that June will be another month in which production will pass the 200,000 mark but the total promises to be slightly less than in May when it was 252,000. It is improbable that volume of output can be continued.

Production still is handicapped somewhat by a shortage of the raw materials from which parts are made. This is the result of caution in ordering on the part of manufacturers who are reluctant to accumulate inventories in excess of the orders actually on their books. The industry as a whole still is proceeding cautiously.

Several more mergers, both of truck and passenger car makers, are in the air and formal announcement of some of them probably will be made in the near future. None of the more prominent companies is included in the merger reports.

Business in Brief

NEW YORK, June 19—No backward steps have been taken either by trade or industry, although the approach of midsummer usually brings some lessening of activities in certain primary lines.

Trade reports—retail, mail order and crops—are cheerful, especially in the North, West and East.

Building apparently is as active as ever, with scarcity of unskilled help and high wages for skilled mechanics.

The strength of manufactured textiles in primary lines has become more marked, with cotton goods showing most aggressiveness, but with another increase in worsted prices announced by the mills.

Shoe manufacturing is gaining in eastern centers with wage settlements being made, and leather is in better demand.

A notable feature in the iron and steel industry is a reduction of 50 cents a ton in iron ore prices, which are now at about the 1917 level. Steel mill deliveries are still falling behind, although plants are operating from 75 per cent to 80 per cent of full capacity.

Railroad traffic continues to gain in the West in spite of the coal strike.

Movement of wheat in the Southwest continues surprisingly large, and it is evident farmers had more than was generally supposed.

Stocks are active but weak, bonds irregular, money easier and foreign exchanges heavy.

Bank clearings for the week ending June 15 were \$6,919,710,000, a loss of 5.2 per cent from the previous week, but a gain of 4.3 per cent over the same week last year.

The only menacing clouds on the horizon are those caused by labor difficulties. The coal strike has continued so long that it threatens next winter's supply, and a rail strike in protest against wage reductions appears to be a real menace. The two together would have a disastrous effect.

Numerous producers already are making plans for the introduction of new models in the early fall, but few of them propose radical departures. Most of the changes will be in the nature of refinements. Chief attention in this respect is being given to closed models. Demand for closed cars is expected to be stronger this fall than it ever has been before because of the sharp price reductions which have brought them more nearly into line with the cost to the consumer of phaetons and roadsters.

Analyze Territories for Balance of Year

Distributors and Dealers Estimating
Sales Possibilities at Re-
quest of Companies

NEW YORK, June 19—Most companies in the motor car field will follow a conservative policy for the remainder of the year. Several of them already have asked their distributors and dealers to make careful estimates of the sales possibilities in their territories for the last half, and tentative schedules will be based largely on these predictions.

The larger dealers have been requested to make careful analyses of the present and prospective general conditions in their territories with full allowance for the effect they probably will have on the sale of motor vehicles. They have been asked, however, to take into account the fact that the sales to farmers probably will be larger than they have been in the past two years, and that the general improvement in industrial and trade conditions has resulted in a sharp increase of purchasing power generally. Another factor which will be considered will be the probable market for closed cars the coming fall.

The last six months of the year never have been as good as the first six for the sale of automobiles, and it is the general expectation that the same situation will prevail in 1922. Most manufacturers expect a seasonal decline in sales in the cities beginning in July, but they believe this falling off will be balanced in part by the strong farm market.

Shipments Exceed May

When the production figures for May were announced, it was felt that there was little probability of June making so good a showing, but, contrary to expectations, shipments for the first week of June were larger than for the first week of May.

Almost without exception manufacturers will continue to buy supplies cautiously, and there is no disposition to make definite commitments for more than 60 days in advance of current needs, and the greater part of the business will be placed on a 30 day basis or even less.

Credit conditions generally are highly satisfactory, and most manufacturers are discounting their bills to parts makers.

STEVENS ASSETS SCALED DOWN

SPRINGFIELD, MASS., June 20—The investigation of Harry G. Fisk and Frank H. Shaw, receivers for Stevens-Duryea, Inc., is said to be nearing completion. Assets of the concern, which were estimated at more than \$4,000,000 are said to have been scaled down somewhat, while the liabilities, given as exceeding \$1,000,000, are said to have shown up as somewhat larger. Early developments in the proceedings are expected.

Court Confirms Sale of Elizabeth Plant

**No Opposition to Purchase —
Durant Takes Steps Prepar-
atory to Occupying It**

NEW YORK, June 20—Sale of the Elizabeth, N. J., plant of the Willys Corp. to Durant Motors, Inc., for \$5,525,000 was confirmed by Judge Bodine in Federal Court at Trenton yesterday. There was no opposition.

Durant and his engineers made a thorough inspection of the factory to-day as a preliminary to the installation of the necessary machinery for assembling the new Star. When the plant is in full operation it will be possible to produce the Star at the rate of 550 a day, thereby bringing the total productive capacity of the Durant divisional plants up to 332,500 a year.

To Organize Subsidiary

Steps will be taken at once to incorporate the Durant Motor Co. of New Jersey, but the capitalization has not been determined. This subsidiary will operate the Elizabeth plant under the direction of F. W. Hohensee, chief engineer for the Durant plants at Long Island City, Lansing and Toronto. Production of the Star will begin at the earliest possible date and it is expected quantity production will be started within sixty days. Production of the Durant four will be continued at Long Island City.

A continuous flow of parts to the Star factory now is assured, but the supply will not be as large as could be desired for some time to come. Several freight carloads of materials now are on the factory sidings ready to be unloaded. The Continental Motors Corp. has given assurance that it will be able to deliver 6500 motors in June and from 7500 to 8500 in July. The output obviously will be governed by the supply by engines.

Skeleton Organization Exists

A skeleton organization to operate the plant was formed at Long Island City some time ago, and no skilled workers will be taken on at Elizabeth under any circumstances before next spring. Probably a year will elapse before any unskilled men will be required. The Durant organization now is such that it will not be necessary to engage any additional executives. This announcement is made by Durant Motors because of the large number of applications received.

Distribution plans for the Star have not been completed, but Durant has summoned to this city about twenty dealers who will be offered district managerships. The organization for the first year probably will not exceed twenty distributors who will be given large territories. They will appoint their own dealers. It is expected that under the Durant contract distributors will be supplied with the Star

Efficiency and Economy of Operation, Chief Factor In Car Building

By F. L. KLINGENSMITH
President of the Gray Motor Corp.

DETROIT, June 19.

PRESENT automobile registration figures in the United States establish a market for at least two million cars a year. This is based on an average life of five to six years a car, and does not take into consideration normal increases occasioned by growth of population or other causes.

There will be fluctuations in this demand of say ten per cent a year at times, induced by poor business conditions and unexpected developments, but the depressions of one year will be made up in the next. We are witnessing now the catching up of the automobile with its normal market after two years' depression.

As registered now there are from five to six million cars in the lowest price field. This means that there will be an average yearly business of one million cars in this field, providing there is only normal deviation from one price field to another. Aside from this assured market, the low priced field undoubtedly will continue to be most favored by the ingress of new buyers.

For three years now the farmer has not bought a thing as compared to the buying formerly existing in this market. The latter part of this year and next he is going to buy the things he has been compelled to do without. Automobiles, trucks and power machinery are prime requisites to the farmer to-day and it is almost certain that the buying from this source, combined with normal buying in other fields, will make business in the fall and next year of major proportions.

To keep the automobile industry thriving it is incumbent on the manufacturer to improve his product and keep improving it. Aside from performing the work that has come to be relegated to the automobile, the manufacturer must plan to make it perform its tasks more efficiently and economically.

The banking situation as pertaining to the automobile market to-day is most satisfactory, due, in a large measure, to the fact that prices have been brought to a point where it is safe for the banker to advance money upon them. This is an important fact for car makers to remember, for the complete co-operation of the banks is imperative where volume business is sought.

There is a constantly widening field for American cars in foreign countries, but here, more than in our own country, the demand for efficiency and economy of operation is the first consideration. Rates of exchange make low prices important. With exchange becoming close to normal in many countries, the American car should enjoy a very wide popularity.

car at cost, and that there will be division of net profits at the end of the year with an established minimum for each car.

Another provision of the contract, it is reported, will be that each distributor must organize a stock company with a substantial paid in capital, part of which will be turned into the treasury of Star Motors, Inc., the selling company.

Evidence of the interest manifested by the public in the Star is found in the fact that 59,303 persons inspected the various models in the three days they were on display in the showrooms of the Poertner Motor Car Co., Durant dealers, in this city last week.

Production of the Durant six at the Muncie, Ind., factory is steadily increasing. On May 31, the Durant Motor Car Co. of Indiana had turned out 1982 sixes, of which 1960 had been sold.

ASH DEMAND GREAT

ATLANTA, June 20—Most of the southeastern lumber mills manufacturing ash advise that the demand for this item from the automotive industry the past two months has increased so steadily that they are having some difficulty keeping up with their orders.

Says Gasoline Price Rise Is Inevitable

WASHINGTON, June 19—An increase in the price of gasoline is inevitable if the demand for the product this summer is to be met, according to John D. Reynolds, secretary and counsel of the Western Petroleum Refiners Association and chairman of a committee of that organization which will present statements relative to the price of gasoline to the Senate Manufacturing Committee.

In discussing the gasoline situation, Reynolds said that the present price is not high enough to afford the independent refiners "a living profit."

ENGLISH BRANCH IN CANADA

MONTREAL, June 20—A dispatch from London says that an English motor car company has decided to establish a branch in Canada, which will permit its product to compete with American cars. The company will turn out a small car in an assembling plant in the Dominion, and if it is successful will experiment with complete manufacturers there. It is hoped to sell the car in Canada for less than \$1,000.

Lincoln to Be Sold Under Ford Contract

Dealers Will Be Expected to
Handle Truck and Tractor
as Well as Car

DETROIT, June 19—Under the reorganization of the Lincoln Motor Co. and the general policies as determined by Ford executives, the Lincoln car will be classed as a Ford product and as such will be subject to sale by all Ford dealers under Ford contracts. Lincoln contracts as formerly effective will pass out of existence and will be superseded by regular Ford contracts.

Under these the dealers and distributors who formerly handled Lincoln cars exclusively will be expected to handle other of the Ford products including the car, truck and tractor. Provision will be made in the contracts, it is understood, for the handling of Lincoln sales in the larger cities on a wholesale basis by the present distributors.

Aggressive Sales Policy Likely

The realignment is taken to indicate a very aggressive policy in the sales end of the Lincoln business. It is also taken to indicate that Ford has completed plans for the manufacture of the car on a large scale and that this will be accomplished largely by using several of the other Ford plants in manufacturing parts for the Lincoln.

Cancellation of the Lincoln contracts as formerly existing and the complete merging of its sale with the Ford products is said to have been a factor in bringing about the break between the Lelands and Fords. The Ford sales organization has been removed back to the Highland Park plant and all sales will be handled from there. The purchasing department of Lincoln was transferred to the Highland Park plant a month ago in the shift which took the Ford sales department to the Lincoln plant.

Engineering offices of both Lincoln and Ford will be moved to the Dearborn plant where Henry Ford has his private offices and experimental laboratories. The engineering office at Highland Park has already been moved and the Lincoln office will soon go. The entire office building at the Lincoln plant will be discontinued as such and if the original plan of Ford is followed out, it will be transformed into a body plant.

Says Lelands May Return

NEW YORK, June 19—The "Wall Street Journal" prints the following dispatch under a Detroit date line:—

"Henry and Wilfred Leland, released last Saturday from the management of the Lincoln Motor Co. by Henry Ford, may come back into the motor manufacturing world as competitors of the Lincoln. Banking interests in the East and friends of the Lelands have offered financial support and are urging a new start. Those interested believe that the Lelands

M.A.M.A. INAUGURATES BEST LETTER CONTEST

NEW YORK, June 19—Directors of the Motor and Accessory Manufacturers Association have decided to award a prize of \$100 in gold to the employee or executive of any company belonging to the organization who writes the best 500 word letter, outlining to present members as well as prospective members the advantages and benefits of using all the departments of the association's service.

The prize will be presented and the winning letter read at the September credit convention. The real purpose of the contest is to educate all the members to the benefits of the association's activities. The letters will be judged by W. O. Rutherford, G. Brewer Griffin and Harry Horning. There is no limit to the number of letters from any one company.

can come back with a high grade car to be named the 'Leland'."

Committee of Creditors for Templar Disbanded

CLEVELAND, June 19—Through the personal efforts of M. F. Bramley, the president and general manager, there has been a sharp improvement in the affairs of the Templar Motors Co. The committee of creditors, which took charge of its affairs some time ago, has been disbanded, and the plan of the Templar syndicate has been declared effective. Under this plan the creditors have agreed to accept 66 2/3 per cent of their claims in full settlement of all the company's obligations.

Production is steadily increasing, and in view of the fact that it is virtually starting again with a clean slate, there is every reason to believe that the company will be successful under the Bramley management.

Friend Realty Unsold; Equipment Goes in Lots

PONTIAC, MICH, June 17—No offer was made for the buildings and real estate of the Friend Motor Car Co. here June 14 when the property was offered for sale at auction by the Detroit Trust Co. as agents in Michigan for the Gotham National Bank, which purchased the property at the face value of its mortgage some weeks ago.

The sale was conducted by Samuel Winternitz & Co. of Chicago, with 50 to 100 persons present. When bids failed on the real estate, comprising about 17 acres of land and several factory buildings, the machinery, supplies, equipment, office furniture, parts and other property were put up in lots and knocked down to the highest bidder in rapid sequence.

Other Makers Scout Tire Surplus Report

Manufacturers Disagree with
Firestone That Akron Plants
Are Overproducing

AKRON, June 20—Akron tire manufacturers are inclined to take as unfounded the warning of President Harvey S. Firestone of the Firestone Tire & Rubber Co., regarding a possible overproduction in tires and have characterized the existence of any unbalanced tire surplus as a myth.

"Although the Akron district is now making close to 100,000 tires a day, and although the conditions obtaining in the industry closely resemble those of 1919 and 1920 as far as demand is concerned, it is becoming apparent that the industry as a whole will not make the mistakes which led to the problems of 1920 by overproducing or by the hiring of unskilled men and women when they are not absolutely needed in the factory," said one prominent Akron tire manufacturer.

When the unexpected sales spurt came for the tire industry a few weeks ago, necessitating the pushing of factories to their maximum production, and causing a shortage of skilled labor, it was feared that the industry might forget the lessons learned during the depression period when they were confronted by a huge tire surplus, and might repeat some of the things that helped to bring about the severe tire sales slump of 1920.

Only Skilled Men Hired

However, a survey of the industry in Akron shows that companies here are hiring only skilled men, and only when men are needed, and that they are not producing in excess of sales, keeping production in direct balance with sales. It is stated frankly by tire men that when orders slump, production will ebb accordingly and will be kept to correspond with sales in the future.

The outlook now is for a continued heavy demand for tires for the next two months, according to Vice-President and Factory Manager Paul W. Litchfield of the Goodyear Tire & Rubber Co., who says: "The seasonal tapering off of sales should start about the end of August and continue until October, when things probably will stabilize at a lower production level, perhaps 75 per cent of the present output."

Goodyear now is making 32,000 tires a day, including its Akron, California and Canadian plants. The Akron output is 26,000 casings daily.

TRUCK CREDITORS EXTEND TIME

LIMA, OHIO, June 19—Creditors of the Gramm-Bernstein Motor Truck Corp. have agreed to extend for five years the time for payment of their claims under a plan which has been worked out by a creditors committee.

A. A. A. Bolters Form Rival Organization

Delegates from Twelve States Help Launch National Mo- torists' Association

CHICAGO, June 19—The National Motorists Association was organized here to-day by about 200 delegates from automobile clubs representing the opposition to the American Automobile Association which developed at the national convention of the A. A. A. in St. Louis last month. The delegates came from about 12 states, including Ohio, Illinois, Michigan, Iowa, New York, Massachusetts, Indiana, Missouri, Texas, Nebraska, California and Washington.

Judge Walter D. Meals of Cleveland was elected president of the association, and a board of governors consisting of 30 members was named.

A constitution setting forth the name of the organization, its principles and purposes and the plan of organization and operation was adopted by unanimous vote of the delegates. The central offices are to be in Washington, D. C. The purposes include co-operation with state and local automobile associations, promotion of good roads, collection of data of interest to motorists, action on legislation affecting motorists, protection of motorists from excessive and unreasonable charges for materials and services used in connection with motoring, and the uniform marking of roads.

To Promote Racing

The constitution also provides for supervision over automobile exhibitions and contests, indicating a purpose to promote shows and races. The following classes of membership are provided for:

State associations, local clubs in states in which there is no state association affiliated with the national body, individual and sustaining. Individual membership dues are \$10 annually; sustaining memberships, \$100 annually and there is a scale of from 15 to 25 cents a member, according to number, for association and club memberships.

Fred H. Caley, president of the Ohio State Automobile Association, acted as temporary chairman. Among the speakers were Judge Walter D. Meals of Cleveland and Richard H. Lee of Chicago, both of whom have been active in the A. A. A. Both predicted that the new association would supersede the A. A. A. Caley announced that he was authorized to affiliate the Ohio association having about 50,000 members with the new organization. Many other delegates said they were not officially authorized to affiliate, but were confident their organizations would come in. Committees on credentials, resolutions and nominations were appointed.

VACUUM TANK SUIT SETTLED

CHICAGO, June 19—A suit instituted by the Stewart-Warner Speedometer

Corp. against the Michigan Lubricator Co. of Detroit, alleging infringement of the Seager and Harrington patents covering vacuum tanks has been settled, and the lubricator company has sold its vacuum tank business to the Stewart-Warner corporation which has acquired several companies making vacuum tanks since it purchased outright the Seager and Harrington patents.

Three Companies Named in Another New Merger

NEW YORK, June 20—Official confirmation is lacking of reports of a prospective consolidation of the Apperson Brothers Motor Car Co. of Kokomo, Ind., with the Supreme Motors Corp. and the Colonial Motors Co., both of Warren, Ohio.

Supreme Motors, which is headed by A. W. Green, manufactures the Supreme Eagle Seal engine for cars, trucks and tractors. Colonial Motors was formed recently by Otis Friend, widely known in the automotive industry, who has proposed to build an assembled car.

It is reported that negotiations for the consolidation of the three companies have been in progress for some time.

Additions for Industrial Motors

NEW YORK, June 19—While no official announcement has been made in reference to additional companies which will be included in Industrial Motors, Inc., the combination of the Selden and Atlas Motor Truck Corp., it is understood that negotiations are pending with at least three more companies, including one in Detroit, one in Chicago and one on the Pacific coast.

The merger ultimately is expected to include a spring company and an axle company, as well as other parts makers.

Kemp Succeeds Eckhart as President of Auburn

AUBURN, IND., June 21—A. P. Kemp has been elected president and general manager of the Auburn Automobile Co. to succeed Morris Eckhart, effective July 1. Kemp has been vice-president and treasurer.

Eckhart has been connected with the company since its organization in 1903, being one of its founders. It is understood that he has retired from all active business and plans to travel extensively during the next two years in Europe and America.

Other officers elected are J. I. Farley, vice-president; E. A. Johnson, secretary; Z. B. Walling, assistant secretary and John Zimmerman, assistant treasurer.

FORD WANTS DAM PRIVILEGE

MINNEAPOLIS, June 19—Representatives of the Minneapolis and St. Paul Trades and Labor Assembly and Twin Cities business men have been invited by Henry Ford to confer with him at Detroit this week, regarding development of the government dam in the Mississippi here.

Electric Auto-Lite Is Now New Company

Sale to Miniger Confirmed—Fail to Adjust Willys and Over- land Troubles

TOLEDO, June 19—The attempt of Federal Judge Killits to iron out the differences existing between the Willys Corp. and the Willys-Overland Co. have been unsuccessful thus far, and the matter has been put on the court calendar for hearing Aug. 1. Judge Killits said he was hopeful that the difficulties might be settled out of court before that time.

The motion was brought up in court to-day, and the court and all interests involved went out to the Overland administration building for a private conference on the claims.

Many Attend Meeting

There were in attendance at the conference session, Judge Killits, Thomas H. Tracy, Rathbun Fuller and Edward Marshall, representing the receivers; Frank P. Kennison and Col. Francis G. Caffey, New York receivers; J. P. Cotton, representing the first preferred stockholders' committee and the Willys Corp.; Forrest Jefferies, representing the corporation; Eldon Bisbee, for the bank creditors' committee; Paul G. Pennoyer, representing the merchandise and construction creditors' committee; Walter Earle, for the common stockholders, and George Hahn, counsel for the receivers.

Up to May 1 the claims filed against the Willys Corp. were \$10,392,707.49, with possibility of some supplemental claims such as the claim preferred by the Overland company.

Assets of the Electric Auto-Lite division will be turned over to a new Ohio corporation known as the Electric Auto Lite Co., with 500 shares of no par value common stock by Clement O. Miniger, the purchaser. This announcement followed the confirmation of the sale in Federal Court here yesterday.

Farm Lighting Contract Made

Attorneys for Miniger announced that he had effected a farm lighting contract with the Willys-Overland Co., which would satisfy the terms of sale. He will receive a credit of \$30,000 upon the purchase price from an advance of funds made from the jurisdiction of the Toledo court to New Jersey.

Miniger said after the sale that the officers of the new Auto Lite company had not been named, but that the same management would continue. It is assumed that he will be president and general manager and control more than 51 per cent of the stock.

Financial and operating statements filed by the receivers indicate that the business of the Electric Auto-Lite property has been increasing rapidly for the last few months. In March the profits were \$224,795.13 and for the month of April increased to \$343,507.81.

Ford Car Shipments To Mexico Increase

Many Go to New Dealers—General Conditions in Country Reported Better

DETROIT, June 17—Reports to the Ford Motor Co. from its Houston, Texas, branch, show a steady improvement in exports to Mexico. In May, 514 cars were shipped to Mexican dealers, all in car load lots. Many of these shipments went to new dealers in parts of Mexico that were without Ford representation up to six months ago.

General business conditions in Mexico are reported much better than for some time. With continued progress toward a normal condition in that country the branch is looking forward to the resumption of train load shipments which it was making until business became poor.

Production of the Ford foreign plants for April was at about the same rate reached in March, the Copenhagen plant being the only one to register an increase. Manchester built 3,013 cars and trucks; Buenos Aires, about 1,000; Copenhagen, 824; Sao Paulo, 154; Bordeaux, 609, and Cadiz, 305. Cork production of tractors fell off slightly.

Compared with business of the year before, April shows a considerable increase. Manchester production about equaled July of 1921. With the exception of one plant, business was approximately trebled in Buenos Aires, Copenhagen, Bordeaux, Sao Paulo and Cadiz, the latter plant showing the largest gain.

The improved foreign situation is arousing an optimistic viewpoint as to the automotive outlook in foreign countries.

Gray Plans to Build 250 Cars This Month

DETROIT, June 19—The Gray Motor Corp. will get into production next week and will build 250 cars this month. This production will be doubled in July and the company will enter upon a schedule of 1,000 cars monthly thereafter. President F. L. Klingensmith said it is expected to continue this schedule for the remainder of the year.

Engine production at the Gray plant is now 15 to 20 daily and will be increased. The company has been held up latterly by the non-delivery of jigs for its bodies but these have now been received and the company is assured of ample body supply from this time on. Delivery of other material has been ample and many chassis have been assembled pending the arrival of bodies.

SENATE ADOPTS ALUMINUM DUTY

WASHINGTON, June 19—The House duty of 5 cents a pound on aluminum scrap and alloys in which aluminum is the component of chief value in crude form was retained by the Senate in vot-

ing the metal schedule of the tariff bill. The Senate committee inserted "coils" in the paragraph relating to aluminum plate, sheets, etc., on which the House duty of 9 cents per pound was retained. The 30 per cent duty approved by the Senate committee on airplanes and motor boats, etc., was approved by the Senate.

Big Gain in Delco Sales Reported in Six Months

DAYTON, June 17—The sale of Delco Light, electric houselighting units, increased 25 to 40 per cent during the first six months of 1922, as compared with a corresponding period in 1921. January showed an increase of 15 per cent, and May over 50 per cent. The Delco Light plant is now operating at 60 per cent capacity.

President R. H. Grant is focusing sales efforts on questions removed from the competition of high tension electric lines in many parts of the country. The possibilities of lighting units have been found to be not as large as many manufacturers anticipated a few years ago, when a great many makers entered the field under the stimulus of war prices for agricultural products.

The Delco Light dealer as a general rule has given up the idea of a store in which to sell products, and now operates chiefly from his home or from headquarters established in a garage. The distributor still operates a store, but does not handle the broad line of electrical supplies he did a year or so ago. Delco Light export business, which was 25 per cent of total production, is now at 10 per cent.

Goodyear Increases Wages to Meet Akron Conditions

AKRON, June 17—Wage increases averaging between 5 and 6 per cent have been granted employees of the Goodyear Tire & Rubber Co., following a demand made upon officials of the company by the Goodyear industrial assembly, composed of employees, for wage increases commensurate to those given by other Akron tire companies.

Firestone's wage increase averaged 10 per cent. Other companies have adjusted wages and salaries. Goodyear announces that no horizontal increase in office employees' salaries will be made.

"Neither the profits of the industry nor a higher cost of living seems to justify any wage increase at this time, but they are being made specifically to meet Akron conditions," said Vice-President and Factory Manager Paul W. Litchfield, in announcing the wage revisions.

3478 ADDED TO PAYROLLS

DETROIT, June 19—Another upward swing in employment was reported last week by members of the Employers Association, who added 3478 men to their payrolls, bringing the total to 176,500, which is 60,000 more than for the corresponding week last year and within 10,000 of the total for the same week in 1920.

Indianapolis Plants Aiming at New Marks

Indications Are That Business with Them Will Keep Up Well Through July

INDIANAPOLIS, June 16—Marmon, National and Lafayette factories are aiming at new monthly records during June, with indications of business keeping up well through July.

Marmon went into June with 500 orders behind. May records in retail sales for the entire country are claimed to have been the highest ever reached by the company, although some production records of 1920 surpassed the May figures in factory shipments. Shipments this month exceed last month's figures, though slight material shortages may prevent the breaking of records.

National's recent price cut has resulted in placing this week's shipping records ahead of any week for some years. Factory production is being increased progressively. A greater force of men was put to work this week. Next week will see another increase, and if the orders continue to be received at anywhere near the present rate this process will go on week after week, until the plant reaches capacity.

Conservative in Increases

Although the price cut went into effect as of June 1, there was no time, when the decision was reached, to cover the country in the advertising announcements the first week. George M. Dickson, president of the company, will make haste conservatively in swinging into maximum production. By increasing the force slowly, there will be no wrench of factory systems, and the standards of the plant will be maintained at all times.

Lafayette Motors, recently reorganized, is now turning out more cars than at any time in its history. Six cars a day are being manufactured and shipped, and the inflow of orders seems to be steady. June will certainly be up to May, and July appears as good at the present time.

Cole is making steady progress, with May the best month of the year and with June running as well. H. C. S. keeps at a normal pace established about three months ago when its price cut went into effect.

Lafayette Policy Unchanged

INDIANAPOLIS, June 19—Lafayette distributors were told at a conference at the factory here that negotiations undertaken several weeks ago for a merger with the Pierce-Arrow Motor Car Co. had been definitely abandoned, and that Lafayette Motors now is fully prepared to proceed independently with plans which look far into the future. Assurance was given that no change would be made in the policy of turning out a quality car. Production at the Lafayette factory now is larger than at any time since the company was organized.

Will Trim Schedules When Sales Decline

Makers Do Not Plan Stocking Dealers with Cars or Ac- quiring Surplus

DETROIT, June 19—Any sales lull that may occur in the summer months will not lead to the stocking of cars by dealers or to the manufacture of a surplus by factories, according to leading executives in many plants. Should business fall off heavily, manufacturing schedules will be trimmed accordingly and both the factories and dealers will do business on a sales basis only.

Manufacturing schedules over the winter months have been given little thought as yet but on this point also the factory officials declare whatever stocking is done will be discretionary with the dealer. By adopting a sane manufacturing policy over the winter, manufacturers declare the delays in delivery of the present year can be eliminated without dealers being asked to take more cars than the normal early season would demand.

NEW YORK

NEW YORK, June 17—The first two weeks of June give no signs of a let-up in the demand for motor cars in the Metropolitan district. For most dealers handling the well established makes, the June problem is one of deliveries rather than sales. While the demand continues to be strongest in the medium price class, there is still a brisk business in the higher class and no signs of abatement before July 1 in the smaller car sales.

The New York market to-day seems to present, although in a much milder form, the situation that existed when the post-war boom was at its peak. Inability of several well known makes of cars to make deliveries has caused the public to go shopping for deliveries, and the suspicion has been expressed in some quarters that the demand is somewhat inflated through this "shopping" practice.

Those who looked for a decided decrease in the car sales for June in this district point to the fact that one of the things that is holding up June business is the inability of several dealers to meet May demands with deliveries.

With a few notable exceptions where reserve stocks were depleted or factory shipments curtailed to meet demands from other sections the sales in the New York district for May made substantial gains over the preceding month. This was especially noticeable in the higher price cars.

New York dealers are viewing with considerable interest the increasing

popularity of the closed car even in the orders that called for delivery in the spring and summer months. In some instances the demand has advanced to better than fifty-fifty in favor of the closed jobs, especially in the higher price class.

Truck sales have made steady advancement through the early part of June and the month is expected to show a considerable increase over May. The demand for medium and heavier types of trucks on the whole seems to show more momentum than the lighter delivery lines.

NEW ORLEANS

NEW ORLEANS, June 17—Better conditions in New Orleans than have prevailed for two years, a practical absence of excess stocks of used cars, less halting of sales than was expected as a result of the floods from the Mississippi River, and expectation of heavy sales of trucks adapted to road building are the salient features of a review of the present and prospective market in Louisiana by Vice-President Ginder Abbott of the Abbott Automobile Co. of New Orleans.

Dun, Bradstreet and the government reports, as well as the long recorded observations of New Orleans business men, indicate that New Orleans is to some extent economically isolated from the rest of the country. Depressions reach here long after they are felt in the other large cities, and general revivals of business are likewise later in coming.

The semi-stagnation that followed the period of high prices in 1920 affected New Orleans less than the other cities, according to the government's employment reports. The prospect of excellent crops of cotton, sugar, rice and corn at fair prices has recently been offset only by the Mississippi floods, which affect a relatively small number of persons, but a considerable property value.

(Continued on next page)

ADOLPH PRICKEN DISCHARGED

NEW YORK, June 19 — Adolph Pricken, president of the Hamilton Motors Co. and of the Coastwise Warehouses, Inc., who was on trial before Judge Taylor in Brooklyn on a charge of grand larceny, was discharged when the court ruled that it had no jurisdiction. The charge against Pricken was based on statements that he had induced investors to put money into his warehouse enterprises on the promise of very large dividends. Pricken had returned all the money to dissatisfied investors.

DORT GAIN, 156 PER CENT

FLINT, MICH., June 19—Production of closed cars in May by the Dort Motor Car Co. showed a gain of 156 per cent over May of last year and 374 per cent over the same month in 1920. The company expects that June will show another gain in total production over May.

Rail Car Is Opening Big Field for Parts

Reports Made to Manufacturer of Growing Interest in Gasoline Driven Vehicles

DETROIT, June 17—Reports of an increasing interest shown by street railway car makers and railroad car makers in gasoline driven vehicles to run on rails, have been brought to Detroit by a sales manager for a leading unit parts manufacturer, who declares that there is promise of a large market in the near future for parts for such vehicles.

The parts will be practically identical with those used in automobile and truck construction, except that they will be of sturdier build and design, he said. Engineers in several of the larger rail car making plants have been carrying forward steadily their experiments with gasoline cars, and find that general construction along automobile lines will prove satisfactory for the heavier work.

Although ultimately it is planned by these companies to make all their own parts, there will be a considerable market for a number of years for parts made by independent unit makers, he said, and it will be business of the best sort because of the heavy character of the work and the strong financial position of the companies. Through an intimate acquaintance with the progress of the work, he predicts that an early start will be made in producing these vehicles.

The engines will be more of the marine type than the automobile, but the rest of the assembly will follow automobile design.

Oshkosh Tractor Stock Sales Under Scrutiny

MADISON, WIS., June 20—A hearing on alleged misrepresentation of stock sales of the Oshkosh Tractor Co. in connection with the purchase of the La Crosse Tractor Co. have been held here by the securities division of the state railroad commission. The Oshkosh company was dissolved last December, and its plans abandoned after \$60,000 worth of stock had been paid in and \$40,000 subscribed.

George F. Williams, Oshkosh, representing the stockholders of the Oshkosh company, is alleging three misrepresentations to the stockholders. First, in regard to the amount of stock actually subscribed when application for permit was made to the commission. Second, as to the amount of profits made by the La Crosse Tractor company prior to the filing of this application. Where profits are shown the stock is not classed as speculative. Third, that the stock issued in payment of salaries was sold for the benefit of individuals and misrepresentations made as to the value of the stock.

Widely Separated Sections Report Good Conditions

NEW ORLEANS

(Continued from preceding page)

Abbott says:

The conditions in the city of New Orleans are better than they have been for two years. Buyers have seemed to sense that the manufacturers are to-day marketing automobiles of superior quality at very low prices.

The used car situation has been pretty thoroughly cleared up, and there seems to be at the present time practically no excess stocks of used cars except in isolated cases. Therefore, there is not the usual bidding of one dealer against the other for used cars at excessive prices.

The demand in the territory surrounding New Orleans is somewhat affected by the flood and high water situation, but, while a considerable area has been inundated, an analysis will show that a comparatively small percentage of the population has been affected by these overflows, so that while it has had the effect of somewhat delaying purchases in those particular districts, the business as a whole cannot be considered as having been seriously affected thereby.

I should say that in so far as cars are concerned that the outlook is most promising. The truck business, on the other hand, is not in such good condition, for the reason that during the war period practically all users of trucks purchased in excess of their normal requirements, so that in most instances truck users are overequipped and will not be in the market except for special types of vehicles to meet special conditions until some of the equipment purchased during the war period has been junked. In the surrounding territory the demand for trucks, particularly of a type adaptable to road building, should show a healthy increase during the next six months, in view of the fact that the recently organized highway departments are rapidly rounding into shape for actual road construction.

ATLANTA

ATLANTA, June 16—Sales in the Atlanta territory continue to show some improvement from week to week, a majority of the dealers advise, though as a whole business is not at a point that could be termed satisfactory. The outlook, however, is steadily improving due to advancing cotton prices, and by the latter part of the year the trade is anticipating that sales again will be running along on about a normal basis as compared with the business of pre-war times.

Registrations in Atlanta alone for the week ending Saturday, June 10, were slightly in excess of 175, which indicates a very material improvement as compared with the same period last year when each week's average was around only 50. These registrations include new and used passenger cars and trucks, and inspection of them shows that a

large majority of the sales being made are of medium and lower priced cars, Ford sales well in the lead. Ford business, in fact, the Atlanta dealers state, is considerably above normal and has been holding up well for the past three months.

Registration figures throughout the state show that in the counties where the larger cities are located, such as Savannah, Macon, Atlanta, Brunswick, etc., sales are proportionately greater than they are in the smaller communities. Business among the smaller dealers is at a very low ebb and there is little promise of improvement for some months due to the poor financial condition of the southeastern farmers.

MINNEAPOLIS

MINNEAPOLIS, June 19—The biggest general automobile demand in this territory seems to be for the lower priced cars and for coupes and sedans. One reason for this character of demand is that traveling salesmen find the closed cars give them more consistent protection against the weather, and that they are kept in better trim physically for their work, when they have this protection on the road. Wholesale houses are beginning to realize that the closed car is the most generally useful for their salesmen, and find that their men ask for these cars when the firm does not offer them. This is found true especially in Iowa, for some reason.

An illustration of local retail sales in motor cars by one firm will have the effect of a birdseye view of the general conditions in this line, and the variety of demand. In one day these sales were distributed as follows: Business men, 3; salesmen, 2; merchants, 2; public school teacher, physician, oil company, music teacher, farmer, chef and bookkeeper one each.

General business conditions are indicated in the demand for cars reported by the Ford assembling plant. June sales of cars, trucks and tractors in Minneapolis territory are expected to total \$4,500,000 for 8,840 vehicles, of which 8,190 will be assembled at the local plant.

The force is now 750 men, as against 140 January 1. The capacity is 315 cars every day of eight hours, beginning June 1. The April distribution was 4,806 cars as against the best previous month, which was 4,573 in 1919. May's total was 6,240. The June record for Fordsons is expected to be 750, as against 433 in April. The company expects to sell in the Twin Cities 2,500 vehicles a month through the summer. In May it exceeded 2,000. Sales totaled 1,836 cars and trucks in April.

CALIFORNIA

SAN FRANCISCO, June 19—A record for automobile sales in California was set during the month of May just closed, with 14,088 new passenger cars registered in the state. This surpasses April, 1922, which, until now, had held the record, by 1,837 cars, and the record of May, 1921, by 4,719. This is a gain of virtually 50 per cent in automobile sales for May of this year over the same month last year. A list of the cars sold, compiled by the "Motor Registration News" of Oakland, Cal., indicates that the gain in sales is most noticeable in medium-priced cars, than in high-priced cars, and least in the low-priced cars.

Many dealers were surprised by the great increase in May sales over those of April, 1922, because the peak of the spring selling is reached usually between April 15 and 20. Some of the dealers believe that June and July will be as active as May, and are making preparations accordingly. Southern California led in sales, with 7,269 cars, compared with 6,819 in the northern half of the state. Sales in southern California in May, 1921, totaled 4,888 cars, but that section surpassed this by 49 per cent in May, 1922. In May, 1921, northern California sold 4,481 cars, and beat this record by 52 per cent with its 6,819 sales in May this year.

Truck Dealers Share in Increase

Motor truck dealers shared in the general increase in sales, disposing of 1,944 trucks in May of this year, as compared with 1,206 in May, 1921, a gain of 61 per cent in the year. May, 1922, was the largest and best month the truck dealers and distributors ever have had in this state.

Consistent with this increase in sales, and the prospects of even better business during June and July, dealers in both passenger cars and trucks are expanding their sales forces and increasing their advertising expenditures.

One of the most important recent events was the purchase by the Star Motor Co. of California of five acres adjacent to the Durant Motor Co.'s plant on East 14th Street, Oakland. The land is to be used for an office building and a U-shaped warehouse, surrounding the office building, with spur tracks running into the property.

TRUCK INTEREST INCREASING

PONTIAC, MICH., June 20—Increased buying interest in trucks was indicated at the fourth of the series of agents' and salesmen's conferences held by the General Motors Truck Co. at its plant here. The conference brought together men from the South and Southwest.

Men of the Industry and What They Are Doing

Stephenson Heads Indiana Truck

J. W. Stephenson, executive vice-president and general manager of the Indiana Truck Corp., has been unanimously elected president of the corporation as successor to Charles G. Barley, who died last week after an illness of more than two years. Stephenson has been connected with the Indiana Truck Corp. since 1915 as vice-president and general manager, and had complete charge of its affairs during the illness of Barley. Stephenson and Barley had been associated together in many business enterprises, including a partnership in the Rutenber Motor Co. Stephenson is an officer or director of several other corporations in Marion as well as other parts of the country.

L. J. Ollier Retires from Business

L. J. Ollier has resigned as vice-president in charge of export sales of the Studebaker Corp., effective July 1. He will retire from business and will make an extended European trip for rest and recreation. Ollier has been identified with the corporation for a number of years, rising successively from a salesman to the positions of branch manager at Los Angeles, sales manager at Detroit and vice-president in charge of sales. Harry A. Biggs, vice-president in charge of sales, hereafter will direct both domestic and export sales. Harold S. Vance, formerly assistant to the president, has been appointed manager of export sales, under the direction of Biggs.

Fraser Succeeds McGinness

R. M. Fraser has been appointed purchasing agent for the Chandler Motor Car Co., to succeed the late George E. McGinness. Fraser has been with Chandler for six years, the last two and one-half of which he served as service manager. J. W. Whiteherbe has been promoted to the head of the service department. He has been identified with Chandler for seven years, six of which have been spent in service work.

Goldie Managing Ruggles Truck

R. J. Goldie, for six years factory manager of the Columbia Axle Co., Cleveland, has resigned to become general manager of the Ruggles Motor Truck Co., Saginaw. F. H. Ragan, formerly with the Gemmer Manufacturing Co., has been appointed his successor.

Nash Advances Bliss and Smith

C. H. Bliss is assistant salesmanager of the Nash Motors Co., to succeed W. W. Smith, who has been awarded a direct factory distributing contract at Oklahoma City. Bliss has been identified with the Nash organization for the

last five years, spending considerable time in the factory and working in a number of different departments until he was transferred to sales work. Smith has been associated with Nash ever since its organization. He entered the industry in 1910 when he organized the Speedwell Motor Car Co. Later he joined the Thomas B. Jeffery company and was in its sales department when the plant was bought by C. W. Nash and the Nash Motors Co. was formed. Three years ago he was appointed assistant sales manager.

Hibbard with Maxwell

John Lawrence Hibbard has been elected president and general manager of the Maxwell and Chalmers companies of Canada. Hibbard has had extensive experience in the automotive industry, having served as export manager of the Studebaker Corp. and, recently, as president and general manager of the Cleveland Tractor Co. of Canada, Ltd. M. O. Andrae has been appointed Toronto branch manager. Andrae comes to Toronto from the Sterling organization at Milwaukee, where for some time he was in the cost department and lately in charge of the Milwaukee city branch. R. Bagnall is in charge of service. Bagnall has been connected with the Sterling factory for many years.

Burckart Appointed by Dort

Louis F. Burckart, traffic manager of the Flint Chamber of Commerce, has been appointed traffic manager of the Dort Motor Car Co., succeeding Thomas Cole, who died recently.

Ross at Hagerstown

Herbert N. Ross of New York has taken charge of the Crawford Automobile Co.'s plant in Hagerstown, Md. Ross has been identified with the industry for fifteen years and is a pioneer in the motor truck field.

D. Kirke Moore Joins Dana

D. Kirke Moore has become associated with C. A. Dana as supervisor of sales for the Spicer Manufacturing Corp., Parish Manufacturing Co., Sheldon Axle & Spring Co. and the Salisbury Axle Co., which comprise the Dana group. Moore was one of the organizers of the American Distributing Co. until January, 1912, when he joined the Weston-Mott Co. as general sales manager. Nine years later he returned to the American Distributing Co. After severing his connection with the Weston-Mott Co. he became director of sales for Northway Motor & Manufacturing Co. and the Jackson, Church & Wilcox Co. Subsequently he was identified with Standard Parts as manager of the bearing and axle departments, resigning in 1920.

Clifford, New Jersey Distributor

John E. Clifford, manager of the wholesale department of Warren Nash Motor Corp., New York, since 1918, has resigned to become president and general manager of the Nash Sales Corp. of Jersey City, which he has organized with a capitalization of \$125,000. Prior to beginning his association with the Nash distributor in New York, Clifford served for five years as manager of the Australasian division of the General Motors Export Co. and for two years merchandised and distributed Buick and Oakland cars direct through Australia and New Zealand, when C. W. Nash was successively president of the Buick Motor Co. and General Motors Corp. In 1917, when Nash left General Motors, Clifford resigned to take a position at the Nash factory in Kenosha. The Nash Sales Corp. will handle distribution in Hudson and Bergen counties.

Eustis, Service Body Manager

John R. Eustis will become secretary and general manager of the Automotive Service Association of New York July 1. Eustis is one of the pioneers in automobile activities in New York and has been connected with the trade in one way or another since 1903. Coincident with the change of management will be a removal of the business office and headquarters of the organization to 50 East Forty-Second Street. Eustis will take entire charge of the affairs of the association including the A. S. A. Bulletin, a monthly publication issued by the association.

Schaefer Associated with Brother

Robert H. Schaefer, for several years a member of the sales department of the Tuthill Spring Co., is severing his connection with that company July 1. His purpose is to move to New York and become associated in business with his brother, William H. Schaefer, at 79 Walker Street, who is representing the Tuthill company and several other manufacturers of automobile equipment.

Toland Sent to Coast

H. I. Toland, wholesale manager of the New York Mitchell organization, has been appointed Pacific Coast manager of the Mitchell Motors Co., Inc. At present Toland is at the plant in Racine, making an analysis of his territory. As soon as this is completed, he will leave for the coast with Los Angeles as his headquarters.

Kroneberger With Yellow Cab

W. L. Kroneberger, formerly sales manager for the Commonwealth Motors, has been appointed manager of the sales promotion department of the Yellow Cab Manufacturing Co., Chicago.

Diamond Cab Starts With Big Contract

**1,000 Taxis for New York—
Klingensmith, Beall and Han-
over in Company**

NEW YORK, June 20—The Diamond Taxicab Co. has been launched with Frank L. Klingensmith, Frank F. Beall and Harry T. Hanover, president of the Apex Motor Corp., among its backers. Announcement that these executives would manufacture a standard cab which would sell for approximately \$1,200 was made in AUTOMOTIVE INDUSTRIES of March 2. The new company states that its first fleet of cabs for New York City will number 1000 and that the contract for the initial unit of 250 has been executed. It is expected that the first of them will be on the streets by July 1.

Associated in the venture with Klingensmith, Beall and Hanover are O. D. Havenrich, Fred Lewis and United States Senator Owen of Oklahoma.

The taxicab will be of the town body type with rather less glass than the conventional cab. The panels will be removable so that they can be easily replaced in case of accident. The units will be made very accessible, interchangeable and easy of replacement. One of the novelties of construction is the removable upholstery. When the cushions and backs are removed, the whole inside of the cab can be washed out with a hose without doing damage to anything remaining.

The company will maintain model garages in various parts of the city with club rooms, swimming pool, billiard room, etc., for the chauffeurs. The carbureter equipment is so fixed that no adjustments can be made except at the garages.

Sterling Enters Canada with Own Sales Force

TORONTO, ONT., June 20—The Sterling Motor Truck Co., Milwaukee, maker of Sterling motor trucks, is now entering Canada with its own sales organization and, if sales and business warrant it, will establish a factory here later on.

The head office for Canada will be at 510 King Street E., this city. It is also planned to cover Canada with a chain of factory branches or dealer service stations.

G. B. Wheeler, formerly factory sales manager for the Canadian Fairbanks Morse Co., Toronto, has been appointed Canadian sales manager. Wheeler has been identified with the Canadian Fairbanks Morse Co. for fifteen years, twelve of which were spent in building up an organization of dealers in eastern and western Canada.

PENN, BELMONT MAY MERGE

PHILADELPHIA, June 20—A new arrangement has been made whereby the

Belmont Motor Co., Lewistown, Pa., will build the trucks for the Penn Motors Corp. of Philadelphia. Hilton W. Sofield, Penn president, has been made general manager of the Belmont plant, and a consolidation of the two concerns shortly is expected. The Belmont company, until it recently remodeled the North American tannery at Lewistown, had been without a location since its old plant at Riverton, N. J., was destroyed by fire in 1920.

Total Output in May Now Reaches 256,302

WASHINGTON, June 21—Output of Motor vehicles for May reported to the Census Bureau by 91 passenger car companies and 82 truck companies was 256,302. This is considerably in excess of the estimate of the National Automobile Chamber of Commerce for the month, which was 252,000. Passenger car output totaled 231,699 and truck production 24,603.

Revised production figures for April with approximately the same number of companies reporting showed 197,221 passenger cars and 22,227 trucks made in that month, a total of 219,448. No accurate data is obtainable, but it is estimated that the output in March, 1920, the best previous month in the history of the industry, was 220,000.

It will be noted that truck production continues to approximate 10 per cent of the total and that the commercial vehicle branch of the industry now is operating at the rate of 300,000 a year. The total for 1921 was 154,550. It was 322,039 in 1920 and 316,364 in 1919.

Guilty of Taking Bribe in Skid Chain Contract

WASHINGTON, June 16—Charles J. Ritzman, general manager of a firm of accessory dealers in Detroit, and formerly a captain in the Motor Transport Corp., yesterday was found guilty by the Federal grand jury of accepting a bribe of \$800 for a government order for \$100,000 worth of skid chains.

Ritzman was convicted on the testimony of R. W. Standley, president of the Standley Skid Chain Co. of Boone Iowa, who testified that he had paid the army captain \$800 with marked bills to influence him in recommending the order, it being Ritzman's duty, the testimony showed, to recommend or reject automobile accessories to be bought by the motor transport corps.

Standley testified that in November, 1918, he, with a United States intelligence service operative, fitted up a dictaphone in a room in a local hotel, where the marked money was given to Ritzman while the dictaphone recorded the conversation.

Ritzman declared, in his testimony, that the tender of the money merely aroused his suspicions, and he accepted it in order to expose the party offering it. Two other charges of soliciting a bribe were dismissed against him.

National Will Join Associated Motors

**Stockholders Accept Offer to
Transfer Assets for \$1,175,-
000, Part in Cash**

NEW YORK, June 21—Stockholders of the National Motor Car & Vehicle Corp. decided at a special meeting here yesterday to accept the offer of Associated Motor Industries, Inc., for the assets of the company. Details of the merger will be worked out by the directors, and it will take some time to arrange for the actual transfer of the property.

In effect, the offer of Associated Motor Industries is to pay for the National assets \$125,000 in cash and \$1,050,000 in stocks and bonds of the newly organized corporation.

Creditors of the National company have been asked to accept 10 per cent in cash, 25 per cent in one year notes, 15 per cent in bonds of Associated Motors and 50 per cent in preferred stock of Associated Motors for their claims. Directors of the National company assert that none of the creditors have objected to the proposal, as was done in the case of the Kentucky Wagon Co., which also wants to enter the merger with six or eight other companies, including Jackson Motors and Traffic Truck.

Banking Syndicate Being Formed

Promoters of Associated Motors declare that a banking syndicate is being organized in Chicago to underwrite a bond issue of \$4,500,000 and that these negotiations have been practically completed. The Union Trust Co. of Chicago will act as trustee for the sale of bonds. The combined assets of the companies which will be merged are estimated at slightly more than \$21,000,000.

Before it is formally launched, the name of Associated Motors will be changed. It is probable the corporation will be headed by Will I. Ohmer of Dayton, Ohio.

The National Motor Car & Vehicle Corp. was incorporated in New York in 1916 to take over the assets of the National Motor Vehicle Co. incorporated in Indiana. Its plant at Indianapolis has a floor space of five and one-half acres with an annual capacity of 6000 cars. The company is controlled by New York bankers and brokers.

CONTINENTAL'S BEST MONTH

DETROIT, June 21—Continental Motors Corp. will reach the largest production in its history this month. The company reports the closing of contracts with a number of important truck manufacturers giving it a more extensive outlet for the heavy duty engines than it has enjoyed at any other point. Production of the single six engine is reaching the proportions necessary to meet the demand of its customers.

Booklet on Bodies for All Car Buyers

Association Plans to Distribute Publication Through Auto- mobile Makers

DETROIT, June 21—Under the terms of a resolution adopted at the convention here of the Automobile Body Builders Association, a booklet will be prepared on the care and treatment of bodies, which will be submitted to car manufacturers with the request that it be passed along to persons buying cars as important in the continued service of the body.

This will be part of the general service plan of the association given through the car manufacturer.

The service committee of the association headed by Francis D. Willoughby of the Willoughby Co., Utica, N. Y., will prepare the booklet and will work with the service committee of the National Automobile Chamber of Commerce in compiling it.

The question of servicing bodies was discussed extensively at the meeting, the feeling being that much of the ill treatment to which bodies were subjected and which later entailed service, could be eliminated by the issuance of a publication setting forth essential facts on body care. As a further step looking to service, the committee will draft a set of proposals on what the association is prepared to do and will submit these to the automobile chamber committee, so that a working agreement may be reached.

Speaks on Ordering Timber

Speaking on the hardwood situation, John W. McClare of the National Lumber Association said considerable delay in the cutting of timber had been occasioned by floods in the South, and that it would be late in the year before the new timber would be ready for marketing. He spoke against the practice of specifying certain sections in ordering timber, saying this led to increased prices and to impositions, to some extent, in that lumber was shipped from section to section to meet the demand from the favored spots. This increased freight bills and added to costs without bringing any gain.

Wilson Foundry Prepares to Meet Engine Demand

PONTIAC, MICH., June 19—Work will be started the first week of July on necessary changes and additions at the Wilson Foundry & Machine Co. plant here to meet a demand for 300 Willys-Knight engines daily that has come from the Willys-Overland plant in Toledo.

The changes, according to D. R. Wilson, general manager, will be completed in time for the new schedule to be put into effect this fall, so that the plant can build up a reserve of engines to meet the demand.

MICHELIN TIRE MAN WILL BE "OLD 1895"

MILLTOWN, N. J., June 20—The judges in the contest instituted by the Michelin Tire Co. for a name and slogan for its product have awarded the first prize, \$1,000 in cash, to L. J. Keller, a Kendallville, Ind., banker. The name he proposed for the Michelin tire man was "Old 1895," and the slogan, "Full of Life and Quality."

Michelin tires have been awarded to fifteen others whose suggestions were considered next best. Remarkable interest was aroused by the contest and several hundred thousand suggestions were received. They came from every state in the Union and many foreign countries. The tire man has been used in Michelin advertising since the early days of the industry. The idea was developed in the suggestion of a workman who saw in a pile of tires a crude resemblance to a man.

To provide for the larger output, the extensive plant built here for the Monroe Motors Co. will be brought into active manufacturing use for the first time. It was planned originally to make tractor parts in the building, but this purpose was abandoned and the upper floor of the structure has been used for a plant cafeteria.

S. A. E. Is Deadlocked on Choice for President

WHITE SULPHUR SPRINGS, June 2—The midsummer meeting of the Society of Automotive Engineers is proving a great success, although sport and outside attractions are interfering slightly with the technical program. So many members entered the golf tournament that it had to be divided into three sections.

The real sessions started to-day. The motor bus session, attended by about 150 members, and the aeronautic session, with 40 members, were held this morning. George Green of the Fifth Avenue Coach Co. presented a paper on motor bus design which was one of the most striking ever given before the society.

The nominating committee reached a virtual deadlock in its attempt to choose a president for next year. The arrival of some other members who have been delayed in coming is now being awaited, as there seems to be little hope of a choice being made until then.

NEW YORK CLOSED CAR SHOW

NEW YORK, June 22—The Automobile Merchants Association of New York, Inc., has arranged to hold a closed car show at the Grand Central Palace, Sept. 23 to 30. The show has been sanctioned by the N. A. C. C.

Detroit Has Enough Coal for 2 Months

Detroit Edison Co., Which Supplies Power to Plants, Slowly Increasing Reserve

DETROIT, June 20—The Detroit Edison Co., which supplies power to all automobile plants in the city with the exception of one or two, is building up its reserve of coal to a three months' supply, ample, in its estimate, to carry the district through the present coal strike without the necessity of reducing working schedules to any degree.

At present there is a two months' supply in its bunkers at the several power producing plants, and this is being steadily augmented. This week there are 280 cars of coal in transit from its various supply sources. Unless a railway strike interferes it will have its three months' supply safely in hand within a short time.

No Need of Reducing Power

Should a railway strike check deliveries of finished products by the automobile factories and other industries of the city, the company declares its coal supply will be spread over just that much longer period of time, and it dismisses any thought of being compelled to reduce its power production for this three months' period at least.

After a ten-day period of investigation in the coal fields, an officer of the company reports a continued state of stagnation in the strongly unionized districts in Illinois, Indiana, Ohio, Pennsylvania and West Virginia, but declares there is a gradual increase in production in the districts where the union foothold is of recent origin, or where it had not established a strong claim upon its members.

Ford Has Plenty of Coke

The Ford Motor Co. declared itself comfortably situated as to its coal supply and said that in addition to the stores on hand it is receiving daily shipments from its own mines. Aside from some congestion due to heavy traffic on its railroad there is no difficulty in obtaining coal. All coal being taken from the Ford mines is used in the Ford plants. Unlike other companies suffering from a shortage of coke, Ford has plenty of coke for its manufacturing requirements, and in addition is selling it to its employees for household use. Employees are being urged to buy now to guard against a possible shortage later on. The company is not considering the sale of coke to anyone except Ford employees.

SPANISH FIELD OPENED TO FRANCE

PARIS, June 22 (By Cable)—A commercial treaty between France and Spain has been concluded under which France will get a minimum duty under a most favored nation clause. French automobile manufacturers now will be able to compete in the Spanish market.

Would Put Bus Lines Under Rail Control

Short Lines in Georgia Also Alarmed by Inroads Made by Trucks

ATLANTA, June 20—Because of the tremendous inroads motor truck freight traffic and passenger bus transportation have made the past year or two in the business of the short line railroads of the Southeastern territory, thirty-nine of the lines operating in Georgia have organized what is known as the Georgia Short Lines Association, and will seek legislation immediately for the control of motor bus lines and truck freight traffic.

The primary effort of the association will be to bring about legislation making the motor bus lines common carriers subject to the rules and regulations governing the railroads. This would place bus lines under the direct supervision of the State Railroad Commission.

Score Taxation Policy

The present taxation policy which permits motor trucks to compete with the railroads, charging higher freight and passenger rates, using public highways in counties where the operators of the lines contribute nothing to the cost of these highways which the railroads pay taxes to preserve, was scored at a recent meeting in Atlanta, and efforts will be made to remedy this situation.

At a meeting of bus line operators held in Atlanta this month an organization was formed that will endeavor to defeat the aims of the short line railroads by combating such legislation as it seeks to enact and that, it is believed, would prove detrimental to the truck transportation business.

Laments Conditions

ATLANTIC CITY, June 20—The competition of highway transport was again bewailed by W. J. Tollerton of Chicago, chairman of the annual convention here of the American Railway Association.

Tollerton said:

The railroads are confronted with a field of competition in the form of automobiles and auto trucks which is having a serious effect on local traffic, both passenger and freight.

Insofar as automobile trucks are concerned they are in a position to operate at a very low cost, practically on a government subsidy, having no other expense than a small tax in investment or maintenance of roadway, terminal and other station requirements.

MIDWEST MAKES PROGRESS

INDIANAPOLIS, June 22—Receivers for the Midwest Engine Co. report that subscriptions have been received for \$1,000,000 worth of refunding bonds insuring speedy reorganization and working capital to complete the transfer to the New Midwest Engine Corp. The property will be offered at public sale about July 11. All claims against the old company must be filed with the receivers or Judge Solon Carter in Marion County

134,762 IN MAY MADE NEW RECORD FOR FORD

DETROIT, June 21—A new high monthly production record of 134,762 cars and trucks was established in May by the Ford Motor Co. Domestic output in all plants was 121,073, compared with the previous record of 109,187, which was established in June 1921. The six foreign plants produced 6170 cars and trucks and the Canadian plant 6519. The company estimates that the May record will be bettered this month. Production in American and foreign plants for the first five months of the year was 409,309 cars and trucks, compared with 329,813 for the same period last year.

Each Ford foreign plant, including Canada, showed a considerable increase in output in May over the previous month.

Superior Court by June 29. It is stated that 95 per cent of the creditors and stockholders have assented to the reorganization plan.

Eager Succeeds Armitage as Whitman & Barnes Head

AKRON, June 22—William H. Eager, who has been vice-president of the Whitman & Barnes Manufacturing Co. since 1918, has been elected president to succeed A. D. Armitage, who resigned two weeks ago to devote his entire time to the J. H. Williams Co. of Brooklyn, of which he is vice-president and general manager. Since the sale of the Whitman & Barnes factories at West Pullman & St. Catharines, Ont., to the Williams company, Armitage has served in a dual position as president of the Akron company and general manager of the other.

He will remain a member of the Whitman & Barnes directorate.

Eager, widely known as an engineer, has been with the Whitman & Barnes company for the last 16 years, having joined it as assistant superintendent of the Chicago factory. He was elected treasurer in 1908 and was transferred to Akron in 1909. Two years later he became sales manager.

Frank W. Oliver, widely known as a salesman in the twist drill and reamer field, has joined the Whitman & Barnes organization as eastern sales manager with headquarters in New York.

WORKS ON MERIDEN PLANT

MERIDEN, CONN., June 22—The New Departure Manufacturing Co. has recruited a staff of workmen to put the Meriden plant of the company in readiness for operation. The factory buildings were completed two years ago at a cost of about \$2,000,000. The company has taken on 800 additional workers at its Bristol plant.

A. E. A. Jobbers Favor Extending Campaign

Merchandising Work Features Convention—Business Far Ahead of 1921

COLORADO SPRINGS, June 22—The merchandising campaign which has been under way for 10 months and which is to be supplemented by propaganda intended to foster shop profits and the sale of shop equipment along with accessory sales, was the feature of the Automobile Equipment Association's spring convention which convened to-day.

Jobber members showed strong support of the campaign which was to come before the full session of manufacturers and jobbers with a recommendation that \$60,000 be provided for the second year's work. About \$35,000 of a \$40,000 appropriation for the first year has been spent to date. The plan is to continue the "Ask 'em to Buy" film and kindred activities along with the new film and literature suggesting to dealers methods of making money in maintenance work. One hundred and thirty-five manufacturing houses and 90 jobbers are represented at the convention with alternates and guests bringing the attendance up to 600.

Accessories Sell Strongly

Delegates report business far ahead of 1921 in nearly all parts of the country, and in Canada the revival has begun, though slowly. Shop equipment and utility accessories are selling strongly.

Gordon Lee, chief of the automotive division of the Bureau of Foreign and Domestic Commerce, spoke before the manufacturers division for an hour, describing recent developments of the work of his division. Lee said that recent inquiries indicated that automotive equipment manufacturers would be put into the export business whether they wanted to go into it or not. In many countries, he said, dealers were calling for accessories in addition to standard equipment on American cars.

Per Capita Earnings Increase 3.9 Per Cent

WASHINGTON, June 19—Data compiled by the Bureau of Labor Statistics show that the per capita earnings in the automotive industry for May were 3.9 per cent higher than in April. Comparison of employment in 44 identical automobile factories in April and May for a period of one week shows that the amount of payroll increases averaged 14 per cent and the number on the payroll, 9.7 per cent.

These factories in the week covered by the survey employed 90,992 in April and 99,389 in May. The amount of the payroll in April was \$2,961,591 as against \$3,376,438 in May. The bureau reports that a wage increase of approximately 15 per cent was granted to 20 per cent of the employees in one factory. Two plants report a 14 per cent increase.

Lower Canadian Tax On Cars Over \$1,200

Protests Bring Revision—Increase
Made in General Sales Levy
Remains Unchanged

OTTAWA, June 19—The Fielding budget has been passed as revised and presented by the Minister of Finance. The chief revisions affecting the automotive trade are: Cars valued at not more than \$1,200 each, 5 per cent; cars valued at more than that amount, 5 per cent up to \$1,200 and 10 per cent on the excess over \$1,200. In the original budget the impost on cars selling over \$1,200 was ten per cent throughout. Thus the impost on every car selling over \$1,200 is reduced by \$60.

To this extent the representations made by the Automotive Industries of Canada and the various trade associations bore fruit as they did also in the revision in the matter of imported cars for which bona fide orders were placed prior to midnight of May 23, the day the original budget was brought down.

A ruling was given some time ago that the tax would not apply on cars of domestic manufacture where affidavits from purchasers and dealers showed that orders had antedated midnight of May 23 but would apply on cars not then imported to fill orders.

To this the importers protested vigorously with the support of the general trade and industry. As a result the revision provides that the excise duty on automobiles shall not apply on cars purchased before May 24 and imported and entered for consumption on or before July 1. The 50 per cent increase in the general sales tax stands, in addition to the special tax. The sales tax now is 4 per cent and 6 per cent on passenger cars of domestic and foreign manufacture respectively.

New Oakland 2-Passenger Coupe Marketed at \$1,285

PONTIAC, MICH., June 19—A two-passenger coupe of standard closed car construction and priced at \$1,285 f. o. b. Pontiac, has just been put on the market by the Oakland Motor Car Co. It is mounted on the regular Oakland chassis. The body is built in accordance with regular coach making practice over a rigid frame work.

Genuine leather and automobile cloth are used in the interior and plate glass for the windows. A feature is the wide door opening on each side of the body. Lever operated windows are fitted for easy regulation of temperature in any weather. The doors have double latch catches with locks in the handles.

The seating arrangement permits the driver and passenger to sit side by side. The lower portion of the windshield is built stationary into the body to make it weather-proof, while the upper half is adjustable. A cowl ventilator is adjustable from the dash and there is a

REVOKING LICENSES CURTAILS ACCIDENTS

BOSTON, June 19—Drastic action taken by Frank R. Goodman, state registrar of motor vehicles, to keep down the number of accidents by revoking the licenses of careless drivers, is meeting with material success. Representatives of the department follow up all complaints, and in most cases the licenses of drivers against whom complaints are made are revoked. The revocations already number approximately 5000. They are for various periods from 30 days to one year.

windshield visor. There is a large compartment under the rear deck for heavy luggage, with a deep, covered compartment back of the driver's seat to provide for smaller parcels.

The instrument board is of walnut, with all instruments silver faced and glass covered. The steering wheel is of corrugated walnut with a nickel plated steering column. The standard equipment includes snubbers, visor, rear view mirror, windshield wiper and non-skid cord tires. The tire size is 32 x 4 in.

New Kelly-Springfield Truck Model to Be Built

SPRINGFIELD, OHIO, June 20—Within the next six weeks the Kelly-Springfield Motor Truck Co. will make formal announcement of a new model of motor truck, according to announcement by Frank H. Peitsch, general manager.

Orders are gradually increasing, he said. An order was filled for railway motor buses Monday for a copper company in Nevada. An official test of one of the company's railway buses was made to-day on the Baltimore & Ohio Railroad in West Virginia. The Kelly company has booked a large order from the railroad.

The Springfield plant of the International Harvester Co. is keeping up its 50 trucks a day shipment, Superintendent C. H. Morton states. Inability to get parts is causing some delay in forwarding shipments.

Y. F. Stewart Acquires Coats Steam Car Co.

COLUMBUS, OHIO, June 22—The Coats Steam Car Co. has been taken over by the Y. F. Stewart Motor Car Manufacturing Co. with a capital of \$2,500,000 and has purchased the former plant of the Immel Co. in this city, which was sold by the receivers several months ago.

The Stewart Corporation will have plants at Bowling Green and Louisville, Ky. The company will turn out a low priced steam car developed by G. A. Coats, who will be vice-president and general manager of the corporation.

Hoover Aids Graham "Anti-Dumping" Bill

Sends Letters to Finance Committee
Senators on Sale of
War Materials

WASHINGTON, June 20—Early passage of the Graham "anti-dumping" bill by Congress has been urged by the Department of Commerce, it has been learned. The measure, which would prevent the return to the United States of automobiles and other war supplies by imposing a 90 per cent ad valorem duty on them, is needed, the department believes, to stabilize the American market.

Passage of the bill is being urged by the department as a matter of fairness to American producers. Secretary Hoover, in a letter to certain members of the Senate Finance Committee, who are now holding up further consideration of the bill, has pointed out the fact that the government has sustained enormous losses on the sale of war supplies in Europe.

These losses by the government have resulted in profits by the speculators abroad, thus enabling them to take advantage of the government's prices and re-import millions of dollars' worth of motor vehicles into the United States, cutting prices and underbidding legitimate manufacturers. This, the department has notified members of the committee unofficially, is unfair to the American manufacturer.

No Organized Opposition

There appears to be no organized opposition to the passage of the measure, although it has been before Congress for 10 months. It was first reported to the House Aug. 10, 1921, from the House Military Affairs Committee, passed the House on Aug. 12 and was referred to the Senate Finance Committee.

Senator McCumber, chairman of that committee, has devoted practically his entire time to the tariff bill, and the committee has held no hearings on the measure. In a letter to the department, Chairman McCumber expressed doubt as to the necessity of the bill to protect the automobile market.

Figures were immediately secured by the department showing approximately 8000 cars available for re-import, which, it is stated, will be brought back and sold in the United States unless the anti-dumping measure is speedily passed.

These figures were furnished the committee by Secretary Hoover three weeks ago.

SALON DATES IN DECEMBER

NEW YORK, June 22—The 18th annual automobile salon will be held in the Commodore Hotel from Dec. 3 to 9 inclusive. It will be repeated in Chicago the latter part of January while the national automobile show is in progress. The entire ballroom floor of the Commodore will be used for the display.

FINANCIAL NOTES

Reynolds Spring Co., Jackson, Mich., has declared a dividend of 1% per cent on the preferred "A" stock payable June 30 to stockholders of record at the close of business June 27. A dividend of 14 per cent has also been declared, being all of the accumulated dividends on the preferred "B" stock and payable June 30 to stockholders of record at the close of business June 27. All dividends on both classes of preferred stock having now been paid in full in cash, the board of directors may at its discretion declare dividends on the common stock from time to time. Donald Ford of Goodbody & Co., New York, has been elected a director of the company to take the place of Rafe S. Craft, resigned.

Durant Motors, Inc., stockholders at a special meeting to be held June 27 will vote on a proposal to increase the capital stock to 2,000,000 common shares of no par value. The present authorized capitalization is 1,000,000 shares, of which about 700,000 are outstanding. The 300,000 shares of unissued stock are being held in the treasury for the use of converting stock of the subsidiary companies into stock of the parent company. Authorization of the new stock is being asked in order to provide additional shares for conversion purposes and to provide means of possible future expansion.

Firestone Tire & Rubber Co. of Canada, Ltd., is offering through Otis & Co., New York, at 99 and accrued interest to yield about 7.10 per cent, a new issue of \$1,500,000 of fifteen year first mortgage 7 per cent sinking fund gold bonds. The bonds are dated June 15, 1922. The issue represents the only bonded indebtedness of either this subsidiary or the parent company.

Jordan Motor Car Co., Inc., has declared the regular 1% per cent quarterly dividend on preferred stock payable to stockholders of record June 15. President Edward S. Jordan states that the factory is running at capacity production and that the earnings during May were more than sufficient to take care of the preferred stock dividend require-

Hudson Motor Car Co. and Essex Motors consolidated balance sheet as of May 31, 1922, shows cash, \$6,826,100; sight drafts for car shipments, \$2,262,237; accounts receivable, \$270,000; notes payable, \$3,500,000; accounts payable, \$4,218,000; accrued accounts and distributors' deposits, \$954,900 and surplus, \$12,284,000.

Barlow Steam Car Co. has been formed in Detroit with a capitalization of \$300,000 made up of 30,000 shares at \$10 a share. Paid in cash is \$23,500 and paid in property \$228,755. Principal stockholders are Lester Barlow, 9000 shares; Wayne R. Barlow, 650 shares and Byron Pierce, 650 shares.

General Motors Corp. directors at their meeting this week took no action on resuming dividends on the common stock. Only the regular dividends were declared on the 6 per cent preferred stock and the two classes of debentures, these being payable Aug. 1 to stock of record July 3.

Dearborn Tractor Appliance Co. has been formed with a capital of \$25,000, 250 shares at \$100; paid in cash, \$5,000. Principal stockholders are John Miller, C. Ford and Clarence Spencer, all of Dearborn.

BRITISH EXPORTS GAIN

WASHINGTON, June 19—The automotive exports from Great Britain during April exceeded those of March by

9 per cent and amounted to £270,971, made up of 142 passenger cars, valued at £110,540; 50 trucks valued at £55,088; 45 chassis, valued at £36,783, and parts worth £68,560.

The United States was the leading market, taking 38 passenger cars valued at £46,411, and two chassis valued at £1,431. Sweden followed with 21 cars valued at £7,396.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week's local money market was characterized by general ease. Call loans covered a range of 2% per cent to 4 per cent, as compared with 3 per cent to 4% per cent in the previous week. On June 12 call funds went to 2% per cent, the lowest level touched since April 24, 1918. Under the influence of the heavy Government financing in connection with the retirement of Victory notes and Treasury certificates of indebtedness and notes, the rate advanced to 4 per cent on June 14, but the next day fell to 3% per cent. In time money the situation was comparatively quiet, sixty days' maturities being quoted at 4 per cent, ninety days, four and five months at 4 per cent to 4% per cent, and six months at 4% per cent, the same as in the previous week.

The Bank of England announced on June 15 a reduction in the bank's official minimum discount rate to 3% per cent from the 4 per cent level, which has ruled since April 13 last.

The Federal Reserve statement as of June 14, 1922, showed a decline of \$2,278,000 in total gold holdings, while other cash reserves showed an increase of \$4,690,000.

Further evidence of the continued improvement in the steel industry is to be found in the United States Steel Corp.'s report showing that unfilled orders on its books at the end of May amounted to 5,254,228 tons, the largest total for any month since May, 1921, when unfinished business amounted to 5,482,487 tons. The total for May, 1922, showed an increase of 157,311 tons over the total at the end of April.

Railroad earnings in April reflected to a considerable extent the effects of the coal strike. According to the complete reports filed by the Interstate Commerce Commission by 201 Class 1 railroads, the net operating income in April was somewhat over \$50,000,000, or at the annual rate of return of 3.93 per cent on the tentative valuation. This compares with a net operating income for March of \$83,500,000, or 5.83 per cent, and \$29,856,000, or 2.33 per cent for April, 1921. For the first four months of 1922 the net operating income of Class 1 railroads was a little over \$211,000,000, or at the annual rate of return of 4.36 per cent, as compared with a net operating income of \$57,408,000 and a rate of 1.18 per cent for the first four months of 1921.

Aluminum Interest
May Be Taken OverOffer Made to Lease Property of
Manufactures, Inc., Including
Patents

NEW YORK, June 22—An offer to lease all the real estate, buildings, machinery and equipment of the Aluminum Manufactures, Inc., for 25 years from July 1 has been made by the Aluminum Co. of America, which, under this proposal, would obtain the right to use all patents, trade names and trade marks.

The Aluminum Co. of America also has offered to purchase the entire inventory at market value July 1 and to take over the capital stock of the Aluminum Die Casting Corp. and of the Aluminum Screw Machinery Products Co., which are owned by the Aluminum Manufactures, Inc., for \$321,200.

Dividends Depend on Action

W. P. King, president of Aluminum Manufactures, has sent a letter to stockholders, in which he says that if this proposition is accepted, the company will be in a position to continue to pay the 7 per cent dividend on the preferred stock; to retire each year 2000 shares of preferred and to pay dividends on the common beginning in 1924 at \$1 a share with \$1.50 in 1925 and \$2 a share thereafter.

"If the proposition of the Aluminum Co. of America is not accepted," King said, "dividends on the preferred stock of the Aluminum Manufactures, Inc., will have to be discontinued, and dividends on the common stock will be remote at best."

A meeting of the stockholders of Aluminum Manufactures has been called on June 29 to ratify the proposition.

Lower Rates for Milk
Or Trucks Will Be Used

WASHINGTON, June 20—Organized milk producers of the country have issued an ultimatum to the railroads to reduce freight rates or compete against a national motor transport. A delegation of the National Milk Producers Federation and representatives of the American Farm Bureau asked the Interstate Commerce Commission for a hearing before final steps were taken for the establishment of a motorized system of distribution.

The commission has been asked to take the passenger rate from milk and make freight rates apply, in order that the 200,000 milk producers may receive the benefit of the recent 10 per cent freight reduction.

Unless the commission permits milk to be transported on the basis of freight rates, instead of the present passenger rates, the railroads will lose practically their entire short haul transportation of milk, which will be taken over and handled by motor transport, the commission was told.

Further Federal Aid Is Assured Highways

Appropriation of \$200,000,000 for Three-Year Program Is Authorized

WASHINGTON, June 20—Federal aid in the construction of highways was definitely assured for three years more when President Harding signed a bill authorizing appropriations of \$50,000,000, \$65,000,000 and \$75,000,000, respectively, for the fiscal years of 1923, 1924 and 1925. Further sums of \$6,500,000 were voted for each of the fiscal years 1924 and 1925 for forest road construction, the funds for this work for 1923 having been cared for in earlier laws.

The authorization for 1923 carries with it definite authority to the Secretary of Agriculture to enter into contractual relations with state highway commissioners for road construction.

The appropriations will be made under the provisions of the Federal aid act of 1916 as amended in 1919 and 1921, which means that the expenditures must be made on those highways comprising the 7 per cent system of main roads. The states are required to maintain the highways once built.

Limits Aid Offered

The most important change in the organic act is an amendment which limits Federal aid participation to \$16,250 per mile for 1923 and to \$15,000 per mile thereafter. This contrasts with the \$20,000 per mile maximum of 1919 and the \$10,000 limit of 1916. The limitation will work no hardship in average conditions, but for special situations where traffic has become very heavy it is not improbable that some change will have to be made at a later session of Congress to prevent the waste resultant from too low a type of construction.

The government has now appropriated or authorized a total road fund of \$587,000,000 since the passage of the Federal aid act in 1916. Figures of the Bureau of Public Roads show that construction has been proceeding for the last three years at the rate of approximately \$80,000,000 annually in Federal funds and as state organizations have now become well stabilized, it is anticipated that this rate will be exceeded in 1923 and succeeding years.

Taxes Must Be Readjusted

WASHINGTON, June 19—A readjustment of taxes in the financing of future highways must be made before the state and Federal governments can be expected to foster a permanent and national highway transport system, according to Thomas H. MacDonald, chief of the Bureau of Public Roads.

The bureau estimates that of the amount spent for highways last year 33 per cent was obtained through Federal aid and motor vehicle tax. The remaining 67 per cent came either directly or will be paid eventually from state and local taxes.

Discussing the subject, MacDonald says:

Development and increase in numbers of motor vehicles and the coincident need and demand for good roads have come so rapidly that methods of raising funds have often been expedients for the time being. Consideration has been given not so much to the just distribution of the cost as to how the funds can be raised with the least controversy and the utmost ease.

This leads to the inevitable conclusion that the whole situation must be gone over very carefully, traffic studies made, and the cost distributed in proportion to the service rendered. There must undoubtedly be a readjustment of the sources of revenue so that a larger percentage will be paid by the road users and a lesser percentage from state or local taxes.

INDUSTRIAL NOTES

Machined Parts Corp. is nationalizing its new parts service to jobbers and dealers throughout the entire trade. The company is specializing in ignition equipment of all kinds. J. E. Hamilton is secretary and treasurer of the company with headquarters in Detroit, having taken that position after leaving the Puritan Machine Co.

Yellow Cab Manufacturing Co. reached its highest production in May, having shipped 425 cabs. Sales are still increasing and the schedule now calls for production of 20 cabs a day.

Excel Tire & Rubber Co. has been reorganized and the stockholders have elected the following officers: President, Mayor Fred Falk of Wadsworth, Ohio; vice-president, Robert Stephenson; secretary, W. I. Dague and treasurer, Z. N. Wallis. The board of directors is composed of Fred Falk, Earl Rickard, Z. N. Wallis, John Ewing, C. M. Wertz, Elton J. Brouse, R. E. Brown and Robert H. Stephenson. The company was recently lifted from a receivership and it is expected that the plant will soon be operating at full capacity.

Black & Decker Manufacturing Co. has established a new Detroit office in the General Motors Building. C. G. Odell, assistant to the president, will use this office as his base, in addition to which it will provide headquarters for the local Detroit representative.

Auto Metal Body Co., Springfield, Mass., is increasing its force and expanding its quarters for the production of Hupmobile bodies. New machinery is being installed. Part of the work is being done temporarily by the Wason Manufacturing Co. at its car shops.

Stewart-Warner Speedometer Corp. sales for the first ten days of June were slightly greater than for the corresponding periods last month and 135 per cent more than a year ago. Last month broke records with the company and the second quarter is expected to make new high marks.

Pennsylvania Pump & Compressor Co., Easton, Pa., has opened a direct district office at 105 West Monroe Street, Chicago, with H. M. Montgomery in charge.

WARD LA FRANCE SOLD

ELMIRA, N. Y., June 22—The property of the Ward LaFrance Truck Corp. has been sold by the receivers to Walker Motors, Inc., of New York. It is proposed to remove the plant to New York and manufacture for the market there a truck similar to the Ward LaFrance.

METAL MARKETS

PRESSURE for early shipments exerted upon steel mills by automotive consumers continues to be one of the outstanding market features. The somewhat more nervous feeling with reference to what the transportation situation will be at the beginning of July tends to intensify this condition. While the majority of automotive buyers of steel do not appear greatly perturbed by the spectre of a railroad strike, they recognize the fact that the shipment of numberless bulk commodities has been deferred until July 1 because of the then effective freight reduction, and the congestion of traffic which must thus be figured with as a possibility makes every one in need of steel for July operations anxious to expedite as much as possible shipments during the remainder of June.

In the sheet industry the situation is strikingly odd. Most of the independent rollers are working, in so far as concerns the bulk of their production, on orders booked at \$2 to \$5 a ton below the levels which they are now quoting for third quarter shipments. A considerable amount of this tonnage for which sheet mills are obligated to consumers will keep pickling and finishing departments fully occupied during the first half of July, so that the placing of third quarter sheet orders in the expectation of obtaining large shipments during the first half of July is fraught with much difficulty. On the other hand, information obtained in the trade as to the extent of August bookings tends to confirm the impression that the mills have relatively little business booked for shipment during that month either at the now obsolete low levels or at the recently promulgated advances.

In fact, in the last few weeks there has been considerable modification of the premiums asked by independent sheet producers over the levels of the chief interest. This is ascribed by many to the peculiar situation with reference to orders for August shipment.

Pig Iron.—Automotive foundries are sounding the market for July and third quarter shipments. Some blast furnace interests have advanced prices recently, and it remains to be seen whether reduced freight rates and lower iron ore prices will bring any appreciable advantages to pig iron melters.

Steel.—Quite a few transactions in full-finished automobile sheets and cold-finished steel bars in which premiums are reported to have been paid took place of late between dealers and consumers. Makers continue to quote cold-finished steel bars on a 2 cent basis for carload lots and the independents' price for full-finished automobile sheets appears to be 4.75 cents, or \$5 a ton above the price of the American Sheet & Tin Plate Co., which remains at 4.50 cents. The independents' quotation for cold-rolled strips is 4 cents base, and there are expectations that on this commodity there will be early upward revision in the American Steel & Wire Co.'s price, which at the beginning of this week was still 3.75 cents, base.

Aluminum.—Recent decision by the Republican members of the Senate Finance Committee to stand pat on the proposed duty of 5 cents per lb. on aluminum has so far failed to affect the market, which is of a steady routine character.

Copper.—Speculative lots press on the market and offset the reserve of producers who are holding their metal at a pegged figure.

Calendar

SHOWS

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

January—Chicago, Annual Automobile Salon.

FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the

Brazilian Centenary Associação Automobilista Brasileira.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiserdamm Hall under the auspices of the German Automobile Manufacturers Association.

September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15—Paris, Automobile Show, Grand Palais.

Nov. 3-11—London (Olympia), Automobile Show.

Nov. 10-Dec. 19—Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

RACES

July 15—Strasbourg, French Grand Prix.

CONVENTIONS

July 17—Baltimore, meeting, representatives of highway departments of ten Eastern states.

June 19-24—Colorado Springs, Summer Meeting, Automotive Equipment Association.

June 26-July 1—Atlantic City, Twenty-fifth Annual Meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall Hotel.

August 28-Sept. 2—Detroit National Safety Congress.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

S. A. E. MEETINGS

June 20-24—White Sulphur Springs, W. Va., 1922 Summer Meeting of Society of Automotive Engineers.

Wisconsin Expanding Motor Bus Facilities

Service Increases 100 Per Cent in Month—Aero Express Cuts Travel Time

MILWAUKEE, June 20—Simultaneously with the announcement of the railroad commission of Wisconsin that motor buses operating as bonded carriers have increased 100 per cent in the last month, bringing the total number of bus lines to 126, the T. M. E. R. & L. Co., of this city, owner of the Wisconsin Motor Bus Lines, announced the inauguration of motor bus service between Milwaukee and West Bend, operating daily over Highway 15; between Okauchee and Oconomowoc on Highway 19; between Buena Vista, Hartland, Burlington and Rochester, with bus connections for Union Grove and Eagles Lake and for Lake Geneva, Elkhorn and Delavan at Burlington.

Within the city limits of Milwaukee, motor buses may soon be operating, if the plans of the Lincoln Avenue and South Division Civic Associations are carried out. Signed petitions for the bus lines have been presented to the public utilities commission of the Milwaukee common council and will be acted upon at the committee's next meeting.

Eight in Madison

The Lake Shore Transportation Co. is seeking a franchise to operate its buses into Milwaukee on Sheridan Road and connect Waukegan with Kenosha, Racine and Milwaukee. To date Winthrop Harbor has given its consent and Zion City has taken the matter under consideration.

The number of Madison's bus lines has already been increased to eight, connecting that city with points as distant as Milwaukee, Fond du Lac, Beaver Dam and Stoughton.

These bus lines are operating largely in competition with interurban lines, and the railroads offering faster and more comfortable travel, but the completion of an aero express line at Milwaukee threat-

ens to quicken the competition in the transportation fields of the state.

The first aero express line between Milwaukee and Chicago was recently placed into operation, enabling passengers to make the 90 mile hop in 45 minutes, according to T. F. Hamilton, president of the Hamilton Aero Products Co., who will pilot one of the two planes on the line. The trains will be closed three-passenger Lincoln runabouts with a double seat for two passengers in front of the pilot. They can make the trip in one-half the traveling time of the fastest limited train.

Birthday of First Sale of Franklin Celebrated

SYRACUSE, June 20—The employees of the Franklin Automobile Co. yesterday celebrated the twentieth anniversary of the sale of the first Franklin car, June 19, 1902, to S. G. Averell of New York. The car was on exhibition throughout the day beside a late model of the Franklin product.

The demonstration took place in the yard of the company and included music by the employees' band and addresses by Mayor John Walrath of Syracuse; S. G. Averell of New York and E. D. Winkworth, president of the Solvay Process Co., Syracuse, representing the Chamber of Commerce.

Dealer Loses All Equity in Car Sold Bootleggers

BIRMINGHAM, June 17—A far-reaching decision which will result in the inauguration of radical changes in the methods of selling automobiles on credit in Alabama has been rendered by the Alabama Supreme Court. As a result, persons desiring to use motor cars for the illegal transportation of liquor will soon discover that their credit rating with automobile companies is negligible.

Under the decision dealers must use due diligence in ascertaining whether or not the purchaser of a car intends to use it for an illegal purpose.

Argentina Prepares for November Show

Early Start Indicates Efforts Officials Are Making to Insure Success

BUENOS AIRES, May 22 (By Mail)—The officers of the Argentina Automobile Club, desirous of holding the annual automobile exposition scheduled for next November on a larger scale than in previous years, have already begun working out preliminary plans toward this end. Circulars have been addressed to all firms engaged in the distribution of motor vehicles inquiring as to what extent they intend supporting the show.

The fact that the club has taken up the question of the annual show so early clearly indicates that its officers intend to do everything in their power to give the show all the prestige it deserves on account of the quality of the cars exhibited and also because of the demonstration it affords of the purchasing power and taste of the Argentine public.

New Features Planned

A great many new features for the coming show have been planned and it is confidently expected that the exhibition this year will be a real exponent of the progress made by motor vehicles in Argentina during the last twelve months. It is now stated that one company will install a model assembling plant on the grounds of the exposition in order to demonstrate the rapidity with which cars are assembled, and no doubt this innovation will attract much attention.

The success already achieved has exceeded the most optimistic hopes expressed by the authorities of the club some months ago. Special efforts will be made to show to the best advantage the latest models. This part illustrates how the automobile dealers here view the future and with what great efforts they are endeavoring to place the automobile upon a high plane of use in this country.